Historic, archived document

Do not assume content reflects current scientific knowledge, policies, or practices.

SHOUT
SHARE
IT

BULLETIN OF THE
U.S. DEPARTMENT OF AGRICULTURE

No. 20

Contribution from the Bureau of Animal Industry, A. D. Melvin, Chief.
December 17, 1913.

THE MANAGEMENT OF SHEEP ON THE FARM.

By Edward L. Shaw and Lewis L. Heller,
Of the Animal Husbandry Division.

INTRODUCTION.

Sheep husbandry should receive more attention from the farmers of this country than it does at the present time. Unquestionably sheep raising could profitably be fitted into the general management of thousands of farms where there is none at the present time. On many other farms the size of the flock could be increased and more attention given to this branch of farming with resulting profit to the owner.

The various phases of sheep husbandry afford numerous channels through which the skill of the producer can display itself. The breeding of purebred stock offers special inducements to many, while a larger number are content with the production of mutton and wool for market purposes. In the breeding of purebred stock the beginner has a number of valuable breeds from which he can make a selection. It is not so much the breed selected that will lead to success as it is the care and management. It must be noted, however, that certain breeds have a wider range of adaptability and are more popular. The number of purebred flocks is increasing every year and the demand for good breeding stock is more than keeping pace with the increase.

With a commercial flock there are several phases that are worthy of consideration. Early spring lambs is one of the most important, while late spring or early fall lambs should receive due consideration. The production of winter or so-called "hothouse" lambs is well worth undertaking by those who are favorably situated. This early lamb is a high-priced product and should prove profitable under favorable conditions.

Many farmers have disposed of their flocks and many others have refrained from entering the business because of some of the difficulties that are peculiar to this industry. Among the most important of these are our dogs, parasites, and diseases. A certain amount of trouble is inevitable where these abound, but ordinarily this should

not be sufficient to discourage the flock master. Good management and proper care will control, if not eliminate, these difficulties. The flock that must rustle for itself is the one that suffers most from these sources. Sheep are good scavengers, but should not be made to subsist upon weeds alone, with little or no attention on the part of the farmer. The sooner the owner realizes that his sheep can not return satisfactory profits under such conditions, the better it will be for him. Any extra care and feed given to the flock generally yields the greatest returns.

Sheep have ever been in the vanguard of civilization. This country has been no exception in this respect. The magnetism of cheap lands has constantly drawn the industry westward, creating a quite general impression that sheep are unprofitable upon high-priced land. This may have been true in the past, but the industry is undergoing an evolution. The range is almost completely occupied and is constantly decreasing in extent. The cost of running sheep in the range country has gradually increased, and to-day many western people are returning to the east for the purpose of raising sheep. The period of exploitation is passing and a new era of constructive live-stock farming is at hand, which means that a more intensive system of sheep farming upon high-priced land must follow. This is already in evidence in certain localities and, with better care than is now generally given the sheep, should prove more extensive. In England the question is not whether you can afford to keep sheep on high-priced land, but whether you can afford to keep high-priced land without sheep.

THE VALUE OF SHEEP ON THE FARM.

INCREASE IN SOIL FERTILITY.

Sheep will increase the fertility of the soil if they are handled properly. To do this they should not be permitted to crop off the grass too closely, which they will do if the pasture is overstocked or if they are kept too long in one field. Sheep manure, with one exception, is the most valuable of all farm manures. It is thinly and evenly scattered over the ground and does not produce a rank growth in spots of the pasture as do other manures. The manure is also worked into the soil by the sharp hoofs of the sheep, so that it is not washed away but becomes available as plant food. This quality has well earned for sheep the title of "Golden hoof." In England land which during Queen Elizabeth's reign produced only 6 bushels of wheat per acre has been made to yield 30 bushels at the present time by the use of sheep. Better cultural methods may be the cause of a portion of this increase, but without doubt the sheep are responsible for the greater part of it.

DESTRUCTION OF WEEDS.

Another equally important way that sheep increase the productivity of the land is in their destruction of weeds. By eating the weeds they make more room for the cultivated crops and increase the supply of plant food and water available for them by preventing the weeds from using it. No other class of live stock, with the exception of goats, will eat as many weeds as sheep. By converting these waste products into wool and mutton they are a source of profit to the owner.

It has been estimated that sheep will eat 90 per cent of all troublesome weeds. They are, in fact, commonly used in cleaning up weeds from fields, fence rows, road sides, stubble fields, and corn fields. The common belief among farmers is that weeds eaten by sheep are so broken up in the digestive processes that the seeds will not germinate after passing through the body as in the case of other live stock. However, weeds are rarely permitted to go to seed if enough sheep are turned in the field while the weeds are young and tender.

In some investigations carried on by the Canadian Government among a considerable number of sheepmen to determine the kinds of weeds eaten by sheep, it was generally agreed that sheep would consume all but a very few extremely unpalatable ones, such as mullein, Scotch thistle, etc. Upon inquiry as to the specific kinds eaten, one farmer replied that he could not give any definite information on the subject as the sheep kept his farm so free from weeds that he could not see what kinds they actually ate.

Where sheep have been kept, but where for some reason they have been disposed of, a striking difference has usually occurred in the appearance of the farm. Weeds have sprung up and grown where they had formerly been kept in check. There is no better solution to the weed problem than a flock of sheep.

ESTABLISHING A FLOCK.

In establishing a flock it is better for the farmer to start on a small scale, unless he has previously had experience. When one is dealing with small numbers, a mistake in management or an error in judgment is not of so great importance as where larger numbers are involved. Starting with a small flock requires less capital also. If it is desired to augment the size of the flock, this can be done by the natural increase, the best ewe lambs being selected each year for the purpose. This should prove more economical than buying all the breeding stock outright. Where the stock is produced on the farm, only the cost of production can rightly be charged against it, but where it is purchased the cost of production plus a profit and very often the price of the reputation of the breeder must be paid. By producing

the breeding stock himself, the farmer should secure a more uniform lot and one better adapted to his own particular conditions. Another advantage of small numbers, especially where capital is limited, is that better animals can be purchased.

A GRADE FLOCK.

A grade flock is desirable under certain circumstances. Where market stock is the sole aim it will doubtless pay better to use grade ewes. It is the improved blood that makes a grade valuable. This being the case, the highest possible grade ewes should be purchased. By using a purebred ram on these ewes—and this is the only kind of ram that ever should be used—a flock can be developed to such a degree of purity that for all market purposes it is equal to the purebred flock.

Again, the financial risk is less with a grade flock, as there is less money invested. A grade flock can at any time be disposed of for its market value. This is not the case with pedigree stock, which, if it must be done immediately, without previous notice, can be sold only at a portion of its actual value.

CONVERTING A GRADE FLOCK INTO A PUREBRED ONE.

A grade flock can gradually be converted into a purebred one at small cost by buying a few purebred ewes and by replacing the grade ewes with the offspring of the purebreds. This is, of course, assuming that a purebred ram heads the flock. This scheme also has the advantage of offering experience to the breeder during a time when his flock is not so valuable.

A PUREBRED FLOCK.

Purebred stock has a number of advantages over grades. These may be divided into natural and artificial. The natural or inherent advantages of purebred stock arise from the fact that there has been a concentrated effort in the development of the better breeds to establish, intensify, and perpetuate their superior qualities by using only the best animals for breeding purposes. There have been some exceptions to this, some inferior animals have entered, but the formation of a breed has in general been based upon superiority in some form. Nevertheless, owing to the reappearance of inferior individuals, not all purebred sheep are suitable to retain in the flock.

A breeder of purebred sheep can develop a reputation that never could be acquired with grades. The sales of pedigree breeding stock extend over a much wider range of territory than those of market stock. The show ring also spreads abroad the fame of the breeder of purebred stock. Larger prices are obtained for purebred ewes and rams when sold for breeding purposes, although it costs little more to

produce them after the flock is once established. There is also more stability in their values than in those of market stock.

Certain artificial advantages have been set up by the establishment of the breeds, because of set regulations that must be met as a condition of registration under these breeds. For instance, no matter how nearly a grade may approach a purebred in identity of blood lines, it never becomes eligible to registry in the associations of the well-established breeds.

CROSSBRED SHEEP.

At times the market, or the natural conditions of a new country, may demand a type of sheep that can best be produced by crossing two breeds. If a demand of this nature is other than temporary a new breed is developed, or the existing breeds are so changed that they fulfill the demand. The Corriedale sheep of Australia and New Zealand are a breed resulting from crossing to meet market demands. As a rule, crossing is not very satisfactory. The reasons for this are that the breeding stock must be maintained separate or brought in from outside the flock and that the lambs are not very uniform, especially after the first generation. Some English investigations indicate that crossbred sheep are less fertile, but it is doubtful whether there is enough difference in this respect to be of any importance.

Cross breeding among the medium and long wool breeds has been rarely practiced in America. Crossing the fine wools with the medium and long wools has been done to a considerable extent in the range country, but to a rather limited extent upon the farm. The general practice has been to use mutton rams upon merino ewes. The object of this crossing has been to improve the mutton qualities, or, in other words, to meet a market demand. In England cross-breeding is a very common practice; purebred ewes, after producing several crops of lambs, being mated to rams of other breeds.

GENERAL TYPE OF SHEEP FOR THE FARM.

The farmer's sheep should be a wool and mutton sheep, with emphasis upon mutton. This "dual purpose" sheep, if the name be permissible, is a proved success, and it is already represented in some of the breeds. The best type is the most profitable combination of wool and mutton. The investigations of the Tariff Board [1] indicate that sheep farming for wool alone is unprofitable. In investigating 543 flocks of the fine-wool section of Ohio they found that when there was a net credit to wool the percentage of receipts from wool was 38 and from other sources 62. If the raising of sheep for wool alone does not pay in this region, it probably would not in any other part of the farming section.

[1] Report of the Tariff Board, vol. 2, pt. 2.

IMPORTANCE OF PROPER SELECTION.

Selecting the breeding stock is the most important operation in establishing the flock. It would be a much simpler problem if the visible qualities, such as form, were the only ones concerned, but such is not the case. Functional characteristics, such as fecundity and good milking qualities, are equally important. Too much attention can not be given to this phase of selection. Upon success or failure of proper selection depends the advance or retardation of the flock. The old adage, "Well begun is half done," was never more appropriate than here.

IMPORTANCE OF SELECTING HEALTHY BREEDING STOCK.

It is necessary to pay special attention to the health of the breeding animals. Sheep are affected with so many diseases and parasites that extreme care must be exercised to select individuals free from these troubles. The sheep of the corn belt have been especially troubled with parasites. It is because of the comparative freedom of the range from these pests, and the consequent vigor and robustness of western sheep, that this class of sheep are particularly desirable for breeding purposes.

SELECTING PUREBRED STOCK.

With purebreds there are certain breed characteristics that must be given their due consideration. These may or may not be of value in themselves, but at any rate they are important in that they indicate purity of blood, which blood contains unquestionably superior qualities.

The different breeds are all undergoing more or less of a change. Part of this is actual improvement and part of it is fashion. It is desirable that the breeder of purebred sheep keep up to date in his selection, avoiding "off-type" sheep. He should do this whenever the newly desired qualities do not interfere with the usefulness or value of the sheep; but where constitution, utility, or some other such quality must be sacrificed to fashion, it should be avoided, and more progress will be made in the end. The most improved and at the same time the most up-to-date type should be selected.

With purebred stock it is desirable, if possible, to select all the ewes from the flock of one reliable breeder. More uniformity, both in the ewes themselves and in the lambs, can thus be secured. The purchaser should make it a point to see the stock before buying. If this is impossible, the stock should be shipped subject to approval. Many breeders' show flocks are comprised of purchased or imported sheep of high quality, while their breeding flocks are of a very mediocre character.

SELECTING THE RAMS.

The ram has as much influence upon the flock as the entire ewe flock bred to him, which fact gives rise to the old saying, "The ram is half the flock." The selection of the ram is thus seen to be a matter of prime importance. Improvement in breeding can be brought about in a flock at less expense by the use of a good ram than in any other way. A good ram is a valuable investment, and the few extra dollars in cost over the price of a mediocre one multiply themselves in returns on the lamb crop. The wise selection of a single ram has in many cases made a flock famous.

The qualities desired are that he be a well-balanced individual, bold, and of masculine character, and with abundant vigor and style of carriage. He should be a representative of the most improved breed character and should possess a strong constitution, as indicated by a short, broad head; large, dilated nostrils; a short, thick neck; a broad, deep chest; and a large heart girth.

Abundant digestive capacity is also essential, and it is shown in a large muzzle and a broad, deep middle. A somewhat paunchy ram is often a good breeder, and a certain amount of this is permissible, but when developed to an extreme it is unsightly and is discriminated against. As much quality as is possible without sacrificing strong bone, size, and ruggedness is desirable. It is indicated by density of bone, fineness of fiber and hair, and a general absence of coarseness. The degree of quality present in some breeds is greater than in others, but an excess of refinement is out of place in a ram of any breed.

The head should be masculine, with a clear prominent eye. The neck should be full, swelling gradually to meet the shoulders. A "ewe neck" is very objectionable. The shoulders should be broad but not prominent; level on top, with no tendency toward openness. The breast should be broad and full, the forearm well developed, the forelegs straight and wide apart, and the pasterns strong.

The ram should not be deficient back of the shoulders, but should carry his width in a broad, straight back, well-sprung barrel, and full flank. The loin should be broad and level, the rump long and broad, with no tendency toward droopiness or a pointed rump. The twist should be deep and full, the width of the quarters carrying down in well-developed legs of mutton. The rear flank should be full and well let down, the hind legs straight, without weakness in the pasterns.

The fleece, as nearly as possible, should be uniform over the different parts of the body and should be characteristic of the breed. The skin should be of medium thickness and of a good healthy color for the breed.

It is desirable that he be deep muscled, but to a certain extent this depends upon the care, feed, amount of service, etc. A ram that is

inherently deeply fleshed should be selected, as he is more easily kept, and his lambs will ordinarily have like tendencies.

Endeavor to secure a ram that is prepotent. It is impossible, of course, to determine this in an untried ram, but a superior pedigree is a good indication of it. The object should be to combine individuality with good breeding.

Overfitted rams are never desirable for breeding purposes. They require a long time for reduction to breeding conditions, which should be brought about by abundant exercise and a gradual decrease of rations. By the time they are in breeding condition the mating season is far advanced and a late crop of lambs will result. Very often these overfitted rams are infertile. The breeder should see that the ram is entire (having two testicles) and free from goiter. Never use a ram for breeding that is affected with this disease.

AGE OF BREEDING RAMS.

Ordinarily a yearling or a 2-year-old ram is most satisfactory for breeding purposes. Ram lambs are used to a limited extent when older rams are unavailable. The extent of their use varies with the different breeds and with their age at the breeding season. It is not usually desirable to breed ram lambs to more than 10 or 15 ewes, and 25 should be considered a maximum number. If bred excessively they become stunted and frequently prove nonbreeders afterwards.

Ram lambs are frequently purchased because they are cheaper than older rams. A good ram lamb not infrequently proves a poor yearling, and even with a yearling there may be considerable change before maturity. Wisconsin [1] experiments indicate that the lambs from a yearling ram averaged less in weight at birth than those from older ones. No results were reported on the weights of lambs from ram lambs.

Sometimes an older ram whose breeding qualities are known can be secured very reasonably, where the breeder disposes of him to avoid in-breeding. A ram of this kind often proves a bargain. In a small flock a ram can be used for two seasons, which is as long as a ram can be kept at the head of the flock without breeding him to his own lambs, and this is generally not advisable. In a large flock a ram can be kept longer without in-breeding.

SELECTING THE EWES.

With the ewes as much as possible of the ideal form is desirable, but it is impossible to secure as complete an expression of this as with the rams. The heavier demands made upon the ewes in reproduction prevent it. For this reason, too, much attention should not be given to mutton form in selecting the ewes, to the exclusion of

[1] Agricultural Experiment Station of the University of Wisconsin, Bulletin 95, Madison, 1902.

PUREBRED FLOCK OF SOUTHDOWN SHEEP AT THE MORGAN HORSE FARM, MIDDLEBURY, VT.

An excellent purebred flock, showing a marked degree of uniformity.

FIG. 1.—DOG-PROOF INCLOSURE IN WHICH THE FLOCK IS KEPT AT NIGHT.

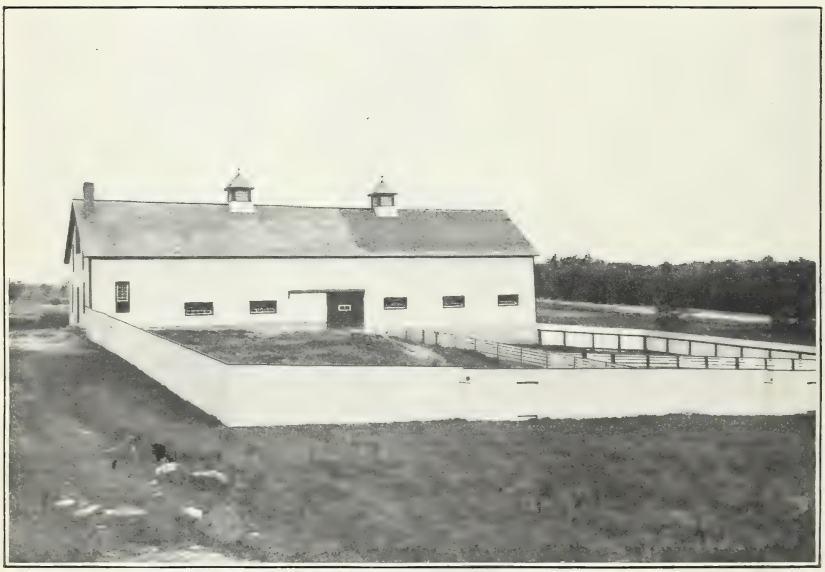

FIG. 2.—SHEEP BARN AT MORGAN HORSE FARM, MIDDLEBURY, VT.

other qualities. Large, roomy ewes possessing some degree of "dairy type" raise the best lambs. Very often the barren ewe, or the one that has lost her lamb, apparently possesses superior mutton form, but this is not due to inheritance, but to the fact that the animal has not suffered the drain of producing and rearing young. Short, plump, "tucked up" ewes are not desirable for breeding purposes.

Femininity is as desirable in the ewe as is masculinity in the ram. While to a certain extent this character accompanies refinement, it should not be mistaken for weakness or an excess of quality. Ewes that are good mothers should be selected as far as possible. This is to a certain degree an inherited quality, though older ewes usually prove better mothers than younger ones. Ewes that disown their lambs or do not have enough milk for them are the source of a great deal of annoyance. It is said that these two conditions are correlated.

Where it is possible, the ewe's former record of production or that of her ancestors should be considered. English investigations covering 327 flocks showed that a ewe which was herself one of twins gave birth to twins more frequently than one that was a single lamb. The Wisconsin station [1] found that twin lambs gain as fast as singles, and that the ewes need lose no more flesh in nursing twins than single lambs. These observations indicate that a ewe that produces twins has more capacity than one raising only a single lamb and that she should prove more valuable in the flock. There are a number of instances where a ewe has produced as many as four lambs that have all lived and grown to maturity, though all were not suckled by the one ewe. There are ewes in every flock that are capable of raising twin lambs, and the number of these can be increased if an effort is made to do it.

This makes plain the importance of keeping accurate records of the flock. Probably not one farmer in a thousand keeps records, so there may be none kept of the flock from which the ewes were originally selected. But there should be a breeding record started as soon as a flock is established, especially if it is a purebred flock.

AGE OF BREEDING EWES.

It is impracticable to give any best age for breeding ewes. Desirable qualities are not all present to the greatest degree at any one time. For instance, the Wisconsin station [2] found that ewes 6 years of age produce a higher percentage of lambs than younger ones. But ewes this old usually have broken mouths and are not generally desirable on that account. Some general rules are worth considering

[1] Agricultural Experiment Station of the University of Wisconsin, Sixteenth Annual Report (1899), Madison, 1900.

[2] Agricultural Experiment Station of the University of Wisconsin, Bulletin 95, Madison, 1902.

on this subject. Ewe lambs are not satisfactory for breeding. With the ram lamb the amount of service can be regulated, but with the ewe lamb that is bred the entire burden of maternity must be borne, as it can not be controlled. An English experiment [1] showed that ewe lambs bred at seven months, when producing and rearing a lamb were stunted to the extent of 17 pounds as compared to those bred at one year and seven months. During the second year of the experiment the difference was lessened, but did not disappear. Ewes should not be bred before 18 months old, and this is the common practice in this country.

In founding a flock it is better to select ewes that have produced lambs. They have less trouble in lambing and something can be told of their breeding qualities.

Overfitted ewes are as undesirable as are rams in the same condition. They rarely produce after this condition has appeared. The presence of fat in the ovaries, or rather the conditions under which it is put on, is destructive to the reproductive organs. They are among the first parts of the body to suffer from high condition.

SIZE OF THE FLOCK.

The number of sheep that can be profitably kept will depend somewhat upon each farmer's conditions. The size of the farm and the number of acres that can be devoted to sheep, the natural fertility of the land, and the system of farming must all be considered. Whether sheep are a specialty or whether a small flock is kept for cleaning up the farm and increasing the fertility are other considerations. During the past, the prices of wool and mutton have had a powerful influence upon the size of farm flocks. There has always been a tendency for most farmers to dispose of their flocks when prices become low and to enter into the business again when the prices become high. Where purebred sheep are kept the size of the flocks are, as a general rule, much smaller.

The work of caring for the flock should be considered in determining the size. Certain chores must be done, and many of these would take little more time with 50 than with 15 or 25 head. Much of the equipment needed for a smaller flock will serve for a larger one. A ram will be necessary for a dozen ewes, while as a matter of fact a mature one could be bred to 50 ewes fully as well.

As a general rule, under mixed farming conditions, one sheep to 3 to 5 acres is considered advisable. The question should not merely be "How many sheep can you keep?" but "How many can you keep healthy?" A small healthy flock is much preferable to a larger one that is diseased.

[1] Journal of the Southeast Agricultural College, Wye, 1909, No. 18.

CARE OF THE FLOCK.

SPECIAL PRECAUTIONS.

Probably sheep are subject to more ills than any other class of domestic animals. At any rate, they seem to be more helpless in repelling the attacks made upon them. This need not discourage the prospective shepherd, since good care and management will obviate most of these troubles. Upon this care and management depends the "luck" of the shepherd. Flocks are known to exist upon weeds and waste roughages with little or no attention, but the returns are proportionately meager.

DOGS.

A well-trained sheep dog is one of the greatest friends of the industry, while the cur dog is one of its worst enemies. The Scotch collie is the sheep dog of America, and a well-trained one can not be appreciated unless seen at work. Their tireless watching, even at night, makes them invaluable to the sheep herder. By their barking they warn him of any prowler that may be lurking about the flock. However, a poorly trained dog, as is found on many farms, is more of a nuisance than a benefit in handling the flock. It is unfortunate that the collie has not found a larger place in flock management on the farm. On the average farm it is the other side of the dog problem that concerns the shepherd. The cur dog has driven many a farmer out of the sheep business and has prevented many more from entering it. The loss to the sheep industry from this source can hardly be estimated. A leading eastern paper on May 28, 1910, printed the following:

> Seventy-five sheep have been killed and 152 have been bitten by dogs that came into the neighborhood last week. Of the 35 flocks of sheep of this town, only 1 escaped the ravages of the dogs. Damages are estimated at $500.

There are thousands of such cases on record. However, the loss in killed and injured is not all the damage. Once the flock has been ravaged the sheep become restless and excitable, and weeks often elapse before they are again making normal gains. Other flocks never fully recover from such attacks and consequently must be disposed of. The reimbursement the farmer receives rarely covers the value of the sheep killed, disregarding the other damage altogether.

There is no complete solution for the dog problem, but there are a number of remedial measures. Among them are more sheep, better dog laws, dog-proof wire fences, sheep bells, and the elimination of the cur dog.

In many sections of the country the raising of more sheep would aid along this line, and this is especially true where only one or a few farmers in a neighborhood are keeping sheep. If every farmer, or a

majority of them, were interested in the industry the dog would stand a poorer show of doing any damage.

A number of sheep bells should be used in the flock. The sheep bell serves as a warning when the flock is being disturbed. The number of bells will depend upon the size of the flock, but with the ordinary farm flock from two to six bells are sufficient.

The elimination of the cur dog needs no further comment. Each farmer should be governed by his own conditions. Farmers in many localities have made use of the telephone in informing their neighbors of the appearance of stray dogs and much damage has been averted as a result.

DOG LAWS.

A more rigidly enforced dog law would rid the country of many of the worthless mongrels. The present taxes on dogs are too often evaded. The following extract from the dog laws of Great Britain is taken from the Canadian Department of Agriculture's report upon the sheep industry and is worthy of consideration in enacting more rigid dog laws.

Dog laws in Great Britain are very simple and very effective. In England and Scotland the license fee is 7 shillings and 6 pence ($1.80) a year. Everyone must pay this license, rich and poor alike, because the law is strictly enforced. Sheep dogs, however, are exempt under certain conditions. If a farmer can prove that he has sufficient sheep and cattle to make it necessary for him to keep a trained dog, he applies for an exemption form and fills it out. When this has been handed to the officer in charge of the nearest inland revenue office, he gets an exemption certificate for that year. If the farmer keeps a sporting dog or a pet dog, no exemption is granted.

In Ireland the license fee is 5 shillings ($1.20) a year, and no exemption whatever. Blind persons in any part of the United Kingdom can also obtain an exemption certificate, providing they can satisfy the authorities that they possess a dog trained to lead them on the highway. The license is not collected for pups under 6 months old, and special arrangements are provided for registered packs of hounds. Licenses are issued at every post office, as at the inland revenue offices. Every dog must wear a collar, to which is attached a small brass disk bearing the owner's name and address and the license number.

Dogs found straying about towns and villages without their owner or other guardian may be seized by the police and, after being detained for three days, unclaimed, are destroyed. When they are claimed the owner is required to pay all expenses incurred during that time. In this connection dog homes are maintained in all towns and villages for the purpose. Although the dog laws are rigorously enforced, they are so well observed that legal actions are very rare.

Sheep worrying by dogs is scarcely known in agricultural districts, and most farmers we interviewed had never had a case of this nature. In some localities adjoining towns and villages they are not so free from this trouble. Such cases are mostly found in congested mining districts, where useless idle dogs are often found. Sporting dogs are also a source of danger, but they are usually well guarded.

Whenever a case of sheep worrying does occur, and the dog is caught in the act, he may be shot at once, but in cases where valuable dogs are caught in mischief, such as fox hounds, the farmer generally traces them to their owner, who gladly meets all the farmer's claims rather than suffer the loss of the dog. When, in other instances,

cases are taken to court, if ownership of the dog is proved, and also that the said dog committed the damage, the dog is ordered to be destroyed and the owner obliged to settle damages in full. Claims for losses may be settled through the county council, but the law is so well observed and loss so rare that private settlements are the general rule.

DOG-PROOF FENCES.

Sheep are more frequently killed at night than during the daytime, and this simplifies the working out of satisfactory measures for prevention. Even with a good dog law a breeder would not care to run any risk of having his flock ruined, and he may, by the use of a dog-proof woven-wire fence, add further protection. In a great many cases farmers could not afford to fence their entire land devoted to sheep grazing, but it is a very simple matter to fence off a small inclosure, as shown in Plate II, figure 1, in a convenient place and keep the flock in this at night. This system has been adopted by many farmers and is to be highly recommended. Wire fence is very durable, and at the present time can be purchased very reasonably, and should be used on more farms devoted to sheep raising. The Department of Agriculture uses a 25-bar, 58-inch, rabbit and stock proof woven-wire fence around its sheep pastures at the Morgan Horse Farm in Vermont.

PREVENTION OF DISEASE AND PARASITES.

The prevention of disease is always more effective and economical than the cure. Every precaution should be taken to keep up the health of the flock, thus warding off as far as possible the attacks of disease. Many of these attacks are the indirect result of failure to give the flock proper attention. An abnormal condition of the parts suffering from neglect affords an easy entrance for disease. Foot rot, which may result from failure to trim the feet and from allowing the flock to run on poorly drained pasture, is a good example.

Parasites are also very troublesome to sheep and are probably the cause of as many failures as any other one thing. Stomach worms are the most troublesome of these at the present time. Rotation of pastures and avoiding land that has been grazed over by infected flocks tends to hold these parasites in check. Precautions should be taken against introducing infected stock into the flock. Many flocks that have been entirely free from disease and parasites have suffered severe outbreaks as a result of failure to observe these precautions.

HANDLING SHEEP.

It is quite as important that sheep be handled properly as that they be properly fed. Ignorance is the cause of a great deal of mishandling, and carelessness is to be blamed for the rest of it. The correct way of handling is the easiest after it is once learned.

CATCHING.

Formerly the shepherd's crook was used largely for catching sheep, as it is still used in England and Scotland and in the West. The crook is used to catch the sheep by the hind leg. Sheep should be confined to close quarters when they are to be caught or handled. They can best be caught around the neck, by the flank, or by a hind leg immediately above the gambrel joint. After being caught the sheep can be easily led by placing one hand beneath the lower jaw and the other to the rear of the buttock. A little pressure upon the dock will usually persuade the most stubborn sheep to lead readily. Sheep should never be caught or led by the wool. Doing this causes a bruise that requires weeks in healing, and there is no necessity for it.

SETTING A SHEEP UPON ITS RUMP.

There are a number of ways of setting a sheep on its rump. Quite commonly they are lifted by main strength and placed in this position. This is difficult for the operator where the sheep is a large one, and it necessitates more or less rough handling of the sheep. A far simpler and easier method is as follows: Taking a stand upon the left side of the sheep, the left arm is placed around the neck. With the right hand grasp the right hind leg just above the fetlock. Pull the hind leg in under the sheep and lift backwards with the left arm. In this way the sheep is set back upon its rump in the easiest possible way. When through with the sheep shove it forward upon its front feet and it can readily rise without needless struggling.

LOADING.

Sheep can be lifted into a wagon handily in the following way: One person stands on each side of the sheep. The right hand of one grasps the left hand of the other between the fore legs of the sheep. The other hands are grasped in a similar manner beneath the hind flanks. In this way the sheep can be lifted quickly and with little effort. A loading chute made of inclined planks with cleats across them to prevent the sheep from slipping is a convenience in loading large numbers. Sheep should never have their legs tied in transportation. A special sheep rack or wagon should be used when many are to be hauled, while if only two or three are being transported they can be tied in the wagon or crated. (See Plate III, fig. 1, and text fig. 1). When shipped a long distance in a crate special arrangements must be made for feeding. If a gunny sack is tacked loosely over the front end of the crate sufficient hay can usually be placed between the sack and the crate. A receptacle for water and grain should also be fastened in the front end of the crate.

HURDLES.

Hurdles are a great aid in handling sheep under certain circumstances. They are convenient in pasturing on rape and similar crops where the sheep are to be confined to a portion of the field. This is desirable in that it prevents the sheep picking out the choicest pasture first and leaving the poorest for the last when, as a matter of fact under fattening conditions, the best should be available. Fencing off part of the field in this way also makes more frequent the rotation of pasture. Woven-wire fencing is also used for making temporary inclosures. Drawings and dimensions of sheep hurdles are shown in figures 2 and 3.

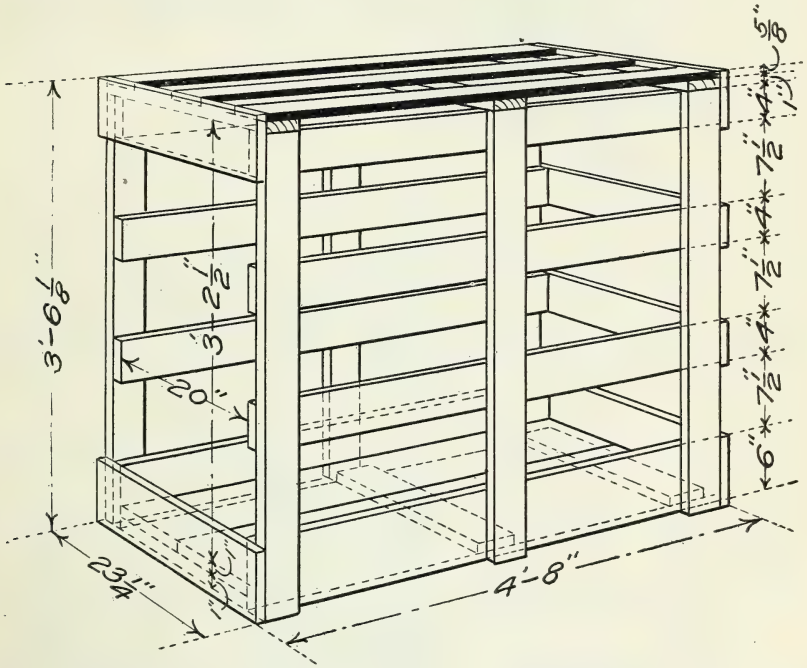

FIG. 1.—Showing dimensions of a crate similar to the one shown in Plate III, figure 1.

Netting has largely taken the place of hurdles in England. Both cord and wire netting are used. The former has proved the more popular. The cord is water-proofed by a mixture of oil and tar. The netting is fastened to temporary stakes either by the use of ropes or staples. Sheep farming in this country has not been intensive enough to warrant a very extensive use of these appliances, but they may be more in evidence in the future. Hurdles are also convenient in making temporary pens. Lighter hurdles that can be handled readily have a place upon every sheep farm. They are well worth their cost.

PENS AND LOTS.

Sorting pens and lots are very useful, especially if the flock is of any considerable size. It is often desirable to separate the different

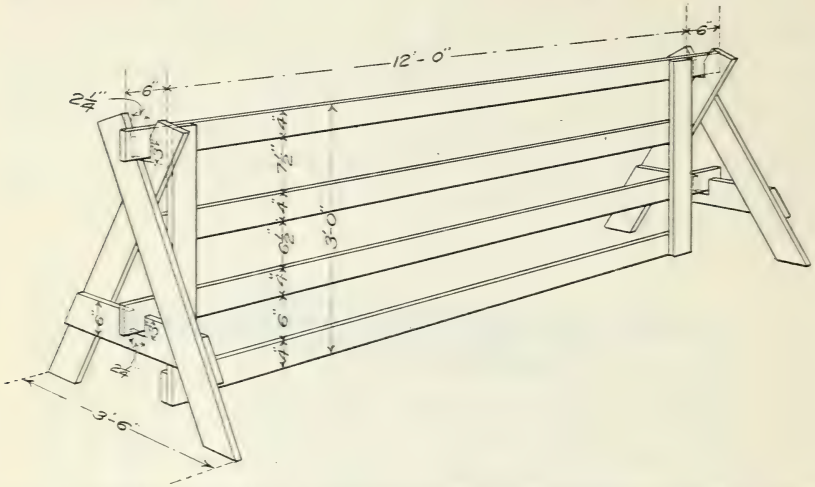

FIG. 2.—Panel and braces for making a portable sheep fence. Wire fencing is also frequently used in the construction of panels.

classes of sheep. A number of lots should be available for this. A chute, with a gate that swings either way, saves much time and

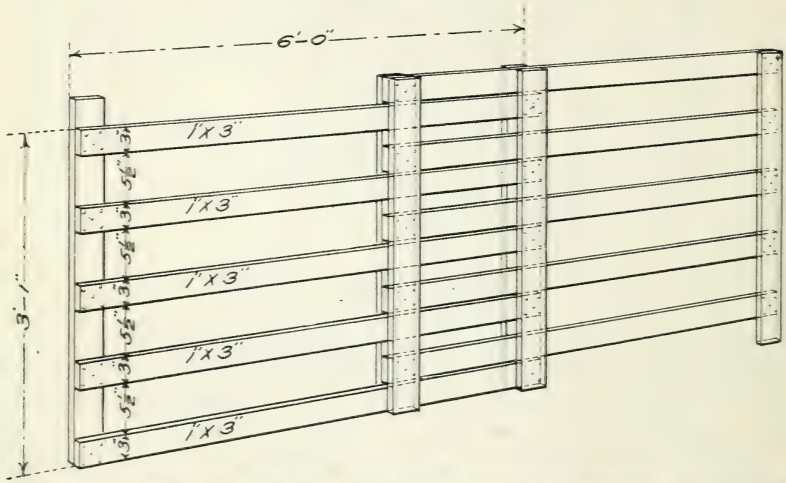

FIG. 3.—Extension hurdle: convenient for making temporary partitions in the pens. Can be closed up to 6 feet 4 inches or extended to 11 feet 4 inches.

trouble in separating the sheep. An arrangement of this kind is illustrated in figure 4.

FENCING.

The lots and pastures upon a sheep farm require considerable fencing. Lack of adequate fences has been one factor in the decline of the sheep industry in many localities. A woven-wire fence is the cheapest and most satisfactory, all things considered. If it must be dog-proof the meshes should be close enough together to prevent the dogs passing through, and it should be at least 5 feet high, which is a desirable height for all outside fences. Care should be taken in putting up the fence to see that the wire is close enough to the ground

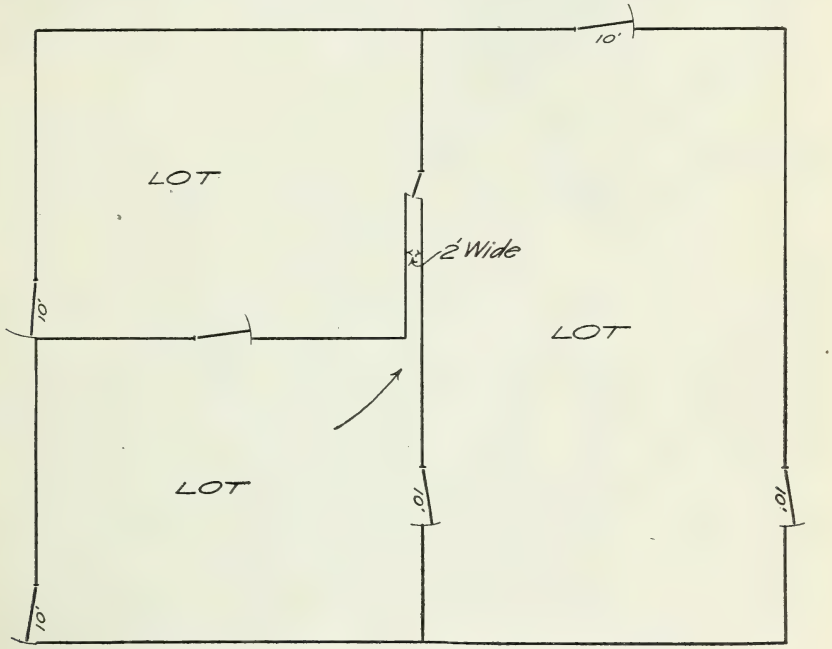

FIG. 4.—Convenient arrangement of sheep lots with sorting chute.

to prevent dogs from crawling under it. For temporary cross fences there are a number manufactured from 32 to 42 inches high. A 36-inch fence is very satisfactory and is used extensively. An advantage of wire fencing is that neither sheep nor dogs will jump it so readily. Barbed wire is undesirable, except at the top, because the sheep tear out their wool upon the barbs.

HOUSING.

It was formerly quite generally thought that the sheep's wool afforded it all the protection necessary during the winter. If the fleece could be kept dry it probably would retain enough body heat to keep the sheep warm, but this is impossible without shelter. When

a fleece once becomes wet it takes a long time for it to dry out, especially in cold weather. Much energy that would otherwise be used for growth or fattening must be used for evaporating this water. The wet fleece also gives rise to unhealthy conditions. In Great Britain little housing is necessary, but in most places in America this would result in undue losses.

Now that it is generally agreed that a certain amount of housing is necessary, the question arises as to what kind it shall be. This depends somewhat upon the locality and the product of the flock. If winter or early spring lambs are to be produced, the shelter must naturally be warmer and more pretentious than where late lambs are the rule. The breed may also affect the kind of shelter required, some breeds being more hardy than others.

The following conditions should be fulfilled as nearly as possible in a shelter for the flock. It should be located upon a rise of ground sloping away on all sides, or at least to the south and east. It should be protected from and should face the side least exposed to the winter winds. The floors should be dry; there should be plenty of ventilation, but also freedom from drafts. An abundance of light is desirable, as is convenience of arrangement, making necessary the least possible amount of work. There should be adjustable divisions forming pens for the different classes of sheep, and it is desirable to have a door leading to the outside from every one of these. The doors should be wide enough so that there will be no danger from crowding, which may result in broken-down hips and abortion. If the doors are closed at all, it should be only in very severe weather. Corners on posts and beams where the sheep come into contact with them should be rounded, so that the sheep will not rub their fleeces against them. From 10 to 18 square feet of floor space should be allowed for each breeding ewe and about 18 inches should be allowed at the feed troughs and hay rack. The quarters should not be kept too warm, or the sheep will be subject to colds and catarrhal conditions. The nearer these ideal conditions are fulfilled the greater will be the amount of feed that can be profitably used in the production of mutton and wool.

SHEDS AND BARNS.

Either sheds or barns are desirable under certain conditions. Sheds are less expensive, and where the flock is not too large they serve very well. Some of the best results have been obtained through their use. There is more work connected with caring for the sheep, as their feed will have to be brought from outside the shed, but this may be offset by the lower cost of construction. "Lean-to" sheds are commonly used upon the farm for sheltering the flock, and can be arranged very satisfactorily.

When a barn is built sufficient outlay is justifiable to make it convenient. Storage should be provided for roughage, grain, and roots. If the haymow is above the sheep it should have a tight floor, so that the hayseed and chaff can not fall down upon the sheep. The root cellar must be frost proof. Barns having two floors for sheep are sometimes built.

The barn should be cleaned out several times during the winter. Slaked lime, gypsum, or disinfectants scattered about dispel the odors that arise at this time. The pens should be bedded down whenever necessary, so that the sheep are kept clean and dry. Shavings are not a very satisfactory bedding material. They become entangled in the wool, and are troublesome in shearing. Wheat straw is the most satisfactory material for this purpose, though oat straw is very good. Ordinarily the refuse from the hay racks affords sufficient bedding. An attractive and desirable sheep barn remodeled from an old farm building is shown in Plate II, figure 2, the barn at the United States Morgan Horse Farm, at Middlebury, Vt.

CARE OF EWES.

Some time between weaning and mating the ewe flock should be culled over. They should be "mouthed," and any broken-mouthed ewes separated and fattened for the butcher. The age at which sheep lose their teeth varies with a number of things. They lose them sooner upon sandy soil than upon clay or loam. Ewes are culled out at 5 or 6 years of age as a general rule. Sometimes an exceptional individual can be profitably kept after this age; especially is this true of purebred ewes, which are frequently kept until 10 or 12 years of age. Such animals, however, require much more attention and such feeds as they can readily eat, if they are expected to continue useful. Barren ewes, those having defective udders, and those that are inherently poor mothers should also be culled out.

FLUSHING.

It has been the general belief for a great many years that having the ewes in a gaining condition at mating time increases the percentage of lambs. This is commonly known as "flushing," and is accomplished by turning the ewes upon rape or other such feeds after having been upon short pasture. Some authorities hold that keeping the ewes in a flourishing condition throughout the year is even more beneficial. However, after three years' observations upon Scottish flocks, F. H. A. Marshall[1] reported that some form of extra feeding immediately before the mating period appeared to increase the percentage of lambs. As to the other, we have no definite information. Having the ewes in flourishing condition also shortens the mating

[1] Trans. Highland and Agr. Soc. Scot., 5 ser., 20.

season and makes conception more sure. This is an advantage in that it shortens the lambing period. Having the lambs as near one age as possible is an advantage when they are to be sold, as uniform lots always sell more readily and at higher prices than uneven ones.

TIME OF MATING.

Some breeds of sheep mate at any season of the year, such as the Barbados. Others, such as Dorset, Tunis, and Rambouillet, mate either in the fall or spring, while the other breeds mate only in the fall. The time of mating depends upon the time it is desired to have the lambs dropped. With those that are bred in the fall, there is a growing tendency to have them lamb as early as possible, as the early lambs are not troubled so much with stomach worms. Where "hothouse" lambs are raised the ewes are mated in the spring or late summer. It is common among Dorset breeders to have most of the lambs dropped in the fall.

With ewes that lamb in the fall the rams are turned in during the months of April, May, and June, while with ewes that lamb in the spring they are turned in during August, September, and October.

GESTATION PERIOD.

The gestation period is the time between the effectual service of the ram and the dropping of the lamb when the ewe is in normal condition. The average has been found by the Wisconsin station,[1] in making observations on more than 1,200 ewes, to be between 146 and 147 days. The time varies somewhat with the individual and with its health and physical condition. The length of the period does not seem to influence the size of the lamb, but if lambs are carried from five to seven days overtime they are usually weak or dead when delivered. Ram lambs are usually carried for a somewhat longer time than ewe lambs and they weigh slightly heavier at birth.

SEPARATING PREGNANT EWES.

It is much better if the breeding ewes can be kept separate from the rest of the flock. They require special management and feeding, and this can be more easily done when they are in an inclosure by themselves. Abundant exercise should be given them. They should not be fattened, neither should they be allowed to become thin.

FEEDING PREGNANT EWES.

Turnips, rutabagas, and swedes are the most desirable roots for breeding ewes, mangels and sugar beets being undesirable before lambing. Frozen roots should not be fed, as it is claimed that they will cause abortion. Frozen or acid silage should never be fed to ewes

[1] Kleinheinz, Sheep management.

or any other class of sheep. Silage of good quality, however, is very desirable. Too large a supply of succulence should not be given ewes before lambing, or weak, unhealthy lambs may be the result.

Oats and bran are as good concentrates as can be secured. Corn alone is too fattening. Whether or not the ewes require grain throughout the entire winter, and the amount they will need, depends largely upon their condition and the kind of roughage and succulence fed. In the Willamette Valley, where abundant green forage is available throughout the year, practically no grain is fed before lambing. But under average conditions succulent forage of this nature is unavailable, and a little grain should be fed, beginning several weeks before lambing, to stimulate the milk flow. An average ewe's daily ration during pregnancy would be about as follows: Two to three pounds of hay, 2 pounds of roots or silage, and one-half pound to 1 pound of grain. Usually one-half pound of grain is enough before lambing if the ewes enter their winter quarters in good condition.

Turning the ewes out after they have eaten their morning feed for water and for a light feed of corn fodder or some similar feed is a good plan when the weather is not too severe. This gives them plenty of exercise and allows the troughs and racks to be readily cleaned out and the evening feed placed in them. Alfalfa, clovers, etc., are the most desirable roughage. Succulence in the form of silage or roots is essential for the best results, as experiments have shown that ewes receiving such feeds produce stronger lambs and have a larger milk flow. Thousands of breeding ewes have died in this country of "blind staggers" brought on by feeding timothy hay without succulence. This particular kind of hay causes constipation and is very undesirable for sheep.

LAMBING.

This is the busiest time of the shepherd's year. The forward ewes should be picked out and placed in a pen by themselves, where they are allowed to lamb. They should be looked after occasionally and aided if necessary. Generally it is not necessary to watch later than 11 o'clock at night, for if a ewe does not lamb before this time she usually will not before 4 o'clock the next morning. Many a ewe or lamb that would otherwise be lost may be saved by a little extra attention on the part of the shepherd. Malpresentation occurs occasionally in the best-managed flocks, and sometimes a ewe may have a lamb that is too large for her to deliver unaided. The normal presentation of the lamb is head first with the lower jaw resting upon the fore legs.

If the lamb is partially delivered under normal conditions, it can usually be helped out by grasping it with one hand by the fore legs and pulling at the same time the ewe strains. If the head or either

leg is back these must be worked forward before delivery can take place. Occasionally lambs are delivered backwards. In this case, if either leg is bent back the fetus must be pushed back and the hind legs pulled out first. If there are no indications of delivery and the lamb is considerably overdue it is probably dead, and it must be taken from the ewe if she is to be saved. Before doing this the finger nails should be closely trimmed and the hands and arms should be thoroughly washed in warm water containing from 2 to 3 per cent of some good disinfectant. If linseed oil is smeared about the passage the lamb can be removed much easier. The hand is inserted into the vagina until a hold can be secured upon the lamb, which is then slowly and gradually worked out, front feet and head first if possible. When it is necessary to remove a lamb in this manner, the ewe should be thoroughly washed out with warm water containing a little disinfectant. This can best be done by means of a small rubber hose and funnel. Some one who has had experience should be on hand in a case like this, as conditions are constantly arising that can not be guarded against by written instructions. If the ewe be a valuable one, it may be advisable to secure the services of a veterinarian.

CLAIMING PENS.

After lambing, the ewe and her lamb, or lambs as the case may be, should be placed in a claiming pen if she refuses to own her offspring. If left loose the lamb wanders about, becomes lost among the flock, and loses its characteristic smell by which the ewe recognizes it. She will then refuse to claim it, and the trouble begins. By placing them by themselves all of this is avoided and a closer watch can be kept upon them to see that all is well. The length of time they should be kept in the pen will depend upon how long it takes the ewe to become reconciled to her lamb. Usually two or three days are sufficient. If the ewe persists in butting the lamb away, she should be tied so as to allow the lamb to suck. This soon brings about agreeable relations between them.

There are two types of pens, temporary and permanent. Temporary pens are conveniently made of some light material and consist of two sides that are hinged together and set up in a corner of the barn by the use of hooks (see fig. 5). Rows of these can be placed along the sides, if necessary. They have the advantage that they take up little room and they can be removed when not in use.

Permanent pens are more desirable in a number of ways. For example, the ewe is more completely isolated from the other members of the flock and consequently becomes reconciled to her offspring sooner. These pens should be about 4 feet square and boarded up tightly so that the ewe can not see the rest of the flock. Lambing pens, in which the ewes are placed before they lamb, are used to some

extent. They are objectionable, however, in that they cause the ewe to become restless and dissatisfied when removed from the flock, which is especially undesirable at this time. If they are so constructed that the ewe can see the other members of the flock, this will be partially remedied.

FEEDING AFTER LAMBING.

After lambing, the quantity of roots or silage and of grain should be gradually increased. The grain ration may be increased to 2 pounds per day, if necessary. In exceptional cases, more than this amount has been fed. After the flock is turned out to pasture and

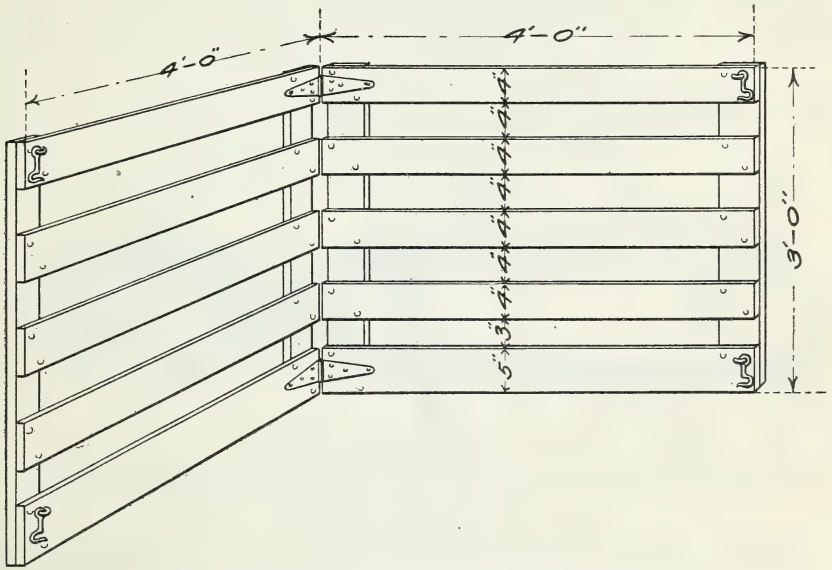

FIG. 5.—Hinged panels for temporary lambing or claiming pens.

the freshness is worn off the grass there is little benefit in feeding grain to ewes, so far as the lambs are concerned. The only difference that it makes is that the ewes do not lose so much flesh. During the summer, if the pasture has become short and parched, additional forage may be necessary. Rape, oats and peas, and green corn are to be recommended for this purpose. During weaning, however, it is advisable to put the ewes upon scant pasture to check the milk flow.

TAGGING EWES.

Returning to the general management of the flock other than feeding, the ewes should be tagged shortly before lambing. This is merely the clipping off of the filthy locks of wool from the hind quarters. The wool should also be trimmed away from the teats so

that the lambs can suck without getting it into their mouths. Swallowing wool frequently causes death, as many as 50 wool balls having been found in one lamb.

Sore teats and udders are of rather common occurence among ewes suckling lambs. Where an inflamed condition has arisen, the udder should be milked out, bathed in warm water, and treated with some antiseptic ointment that will not injure the lamb if taken into its stomach. Carbolated vaseline is excellent for this purpose.

EWES THAT HAVE LOST THEIR LAMBS.

Sometimes it happens that a ewe loses her lamb. If she has a good milk flow, she can be taken care of most readily by giving her a lamb from a ewe that has no milk or from one that has had twins. Several methods have been used for making such a ewe claim her lamb. Among these are, tying up the ewe so she can not butt the lamb about, sprinkling some of her milk over the lamb, and placing the skin of the dead lamb over the one to be adopted.

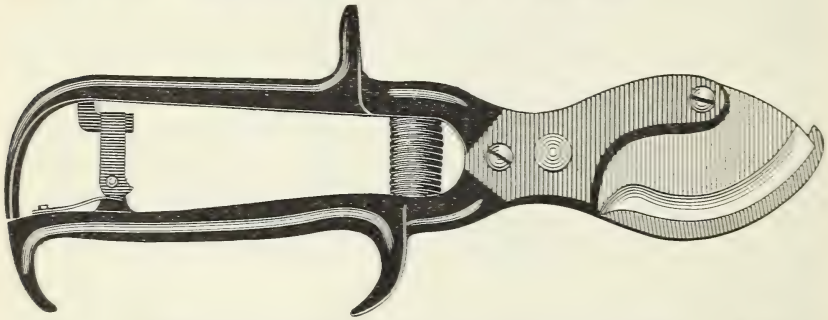

FIG. 6.—Pruning shears or sheep toe clippers used in trimming the feet and also for docking lambs.

SHEARING THE EWES.

Under ordinary conditions, shearing the ewes should take place after lambing. It is also desirable to shear them before turning out to pasture. Otherwise the wool becomes unnecessarily dirty and the ewes remain outside in weather that is too severe for the lambs. Unfortunately, this is not practiced in many flocks. Shearing before lambing is practiced where the ewes are to lamb late, but it requires much more care and experience in handling them, and it is necessarily much slower than shearing afterwards.

TRIMMING THE FEET.

The feet of the entire flock will ordinarily need attention about twice a year. The hard outer shell grows under the soft part of the feet, inclosing more or less filth and making it difficult for the sheep to walk. This superfluous growth should be trimmed away and care must be taken not to cut back too far into the tender parts. Pruning shears, such as are used in docking lambs and trimming small shrubs are valuable for this purpose (see fig. 6). A sharp knife can also be

used to good advantage. Either before or after shearing is an excellent time for giving the feet attention.

DIPPING.

Not only the ewes but the entire flock should be dipped shortly after shearing. They should not be dipped either in extreme hot or cold weather, and if the weather is unfavorable immediately after dipping, protection should be provided them. If dipping is done while the wool is short, it will be more quickly and thoroughly done, less material will be required for the dip, and the wool will dry out quicker. A satisfactory sheep dip is one that will destroy ticks, lice, scab, and all external parasites, and yet will not injure the skin or wool. There are a number of good dips upon the market which are

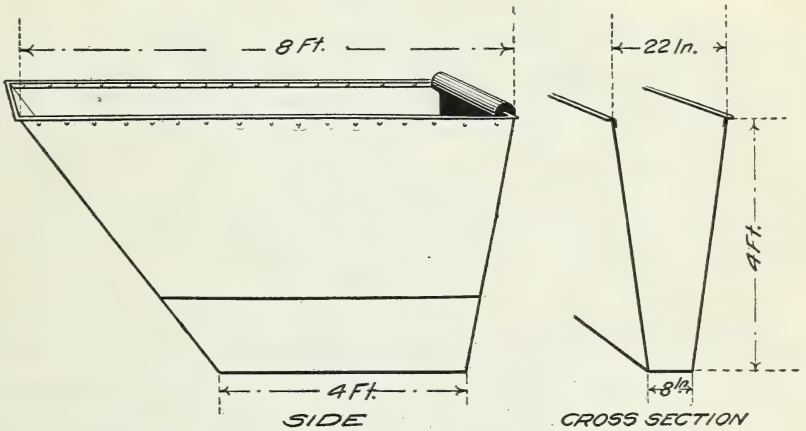

FIG. 7.—Outline of metal dipping tank suitable for the ordinary farm flock.

recognized by the United States Department of Agriculture, any one of which will give satisfaction if directions are carefully followed. It is claimed for some of these that they are an actual benefit to the skin, in that they act as a stimulant.

If the flock is badly infected with scab, it becomes necessary to dip twice, with an interval of ten days to two weeks. The second dipping destroys those parasites that were in the egg stage at the time of first dipping.

A dipping tank should comprise part of the equipment for every flock. They are constructed of galvanized iron, concrete, and wood. A galvanized-iron tank, such as can be purchased upon the market, has several advantages. It is light enough so that it can readily be moved from one place to another. Several farmers can own one in partnership. With the ordinary flock a small tank, such as shown in figure 7, will answer the purpose. Details of a concrete dipping vat suitable for large flocks are given in Farmers' Bulletin 481.

ATTENTION TO EWES AFTER WEANING.

The ewes should be watched carefully for a few days after the lambs are taken away. Most of them, especially the heavy milkers, will have to be partially milked out a few times. Some will not have to be milked more than twice, others perhaps four or five times. As the period of drying up progresses, gradually increase the time between milkings. A ewe can be quickly milked by backing her up against a fence so that she can not go backwards, and pressing the knees against her shoulders so that she can not go forward. Both hands can then be used. Ewes can also be milked out conveniently by setting them upon their rumps, as the operator can see better what he is doing. Inflammation and caked udders are the result of inattention at this time, and the best ewes of the flock suffer most.

CARE DURING REMAINDER OF SEASON.

The time between the weaning of the lambs and mating should be a "resting up" season for the ewes. As a rule they have lost more or less flesh in nursing the lambs, and their systems need toning up. This can best be brought about by an abundance of good pasture, pure water, and shade. Frequent changes of pasture are essential for best results. The flock should be aided in every way in regaining lost vitality, and put in a flourishing condition for the next season's work.

CARE OF LAMBS.

Spring lambs should come early enough so that they will be old enough to eat grass when the ewes are turned out to pasture. Early lambs seem to have more vigor and vitality and they seem better able to resist the attacks of parasites than late ones. They entirely escape most of the ills common to young lambs, consequently they make more rapid growth and thrive much better. For these reasons it is best to have lambs come early.

REVIVING WEAK LAMBS.

Sometimes a lamb is born very weak and seems almost dead when delivered. It may not even be breathing. The phlegm should be cleaned out of its mouth and nostrils and artificial respiration started. This may be done by breathing into the lamb's mouth three or four times, then holding it with one hand upon its belly, patting it with the other just back of the shoulders. It may be necessary to repeat the operation three or four times. Many apparently lifeless lambs have been revived in this way.

HELPING LAMBS NURSE.

It is often necessary to help the lamb nurse the first time. It may be unable to find the teats itself or the ewe may refuse to allow it to suck. After helping it a few times it is usually able to take care of itself.

CHILLED LAMBS.

Lambs should never be allowed to become chilled, but sometimes it is unavoidable owing to the ewe lambing unexpectedly. When chilled the lamb should be given a bath as quickly as possible in water as hot as the hand can bear. It should then be rubbed dry, a dry rag wrapped about it, and removed to a warm place. A box of warm, dry bran is a good substitute for the rag used in wrapping. A half barrel bedded with straw in which a jug of warm water is placed is also convenient. A few drops of whisky in a little warm water makes a good stimulant for the lamb for such occasions. Constipation commonly follows chilling, and it should be guarded against. Castor oil should be given if this condition arises.

PINNING.

Pinning of the tail sometimes bothers the young lambs before they are docked. Diarrhea or a loose condition of the bowels causes the tail to be plastered down to the hind quarters and a foul condition results. Scraping or washing off the collected feces with warm water relieves this condition.

RAISING LAMBS BY HAND.

If a ewe dies or if she is unable to supply her offspring with sufficient milk, it becomes necessary to raise the lamb by hand. Cow's milk, while it is not as rich in solids as ewe's milk, serves as a very good substitute. The milk from the same cow should always be used, and she should be one that has recently freshened. The milk should be heated to about 92° to 94° F., but should never be boiled, as this causes constipation. The lamb may be fed with a spoon for the first few times, but this is too much trouble to continue for any length of time. A nursing bottle with an ordinary nipple is convenient. The secret of success in raising lambs by hand is in having the milk at the right temperature and not boiling it, in feeding often, every hour or two at first, and in having the utensils scrupulously clean.

MARKING.

Marking with labels.—Every sheep of the flock should be marked, and there is no better time for doing this than when they are lambs. If possible they should be marked the day dropped and then there will be no danger of their being confused. Lamb-size labels are sometimes used, being replaced with the regular-size labels at weaning time. It has been said that using the sheep-size labels upon young lambs causes their ears to droop, but some experiments carried on at the Wisconsin station indicated that such is not the case.

The breeder's label is first inserted. It should have upon it the flock number and initials or name of the owner. The most popular label is a metal band, and it has not only been adopted by most of the

breeders but also by the leading breed associations. The association labels have stamped upon them the abbreviation of the breed association and the registry number.

The tag should be placed in the lower part of the ear, fairly close to the head, with the number on the inside. The label should not be too loose or it is more likely to be torn out. Neither should it be too tight or it may damage the ear. Sometimes the ears become sore from inserting the labels, especially if the operation is carelessly performed. Occasional attention should be given the lambs after

FIG. 8.—Methods of marking sheep: *a*, Ear label; *b*, notching; *c*, tattooing.

inserting the labels to insure their ears healing properly. The one objection to ear labels is that they may be torn out. The ear label is illustrated in figure 8, *a*, and the punch for inserting it in figure 9. The latter may also be used for notching.

Notching.—Notching is a good way to mark sheep, and it is quite frequently used. Notches upon certain parts of the ears indicate certain numbers, the sum of the numbers represented by the notches being the number of the sheep. By a series of notches any numbers desired for the farm flock can be obtained. The system is shown in figure 8, *b*. Numbers up in the hundreds involve a rather complicated system, but these are not usually necessary on the farm. To avoid a complex system, each crop of lambs may be numbered from 1 upward. In this way it will not generally be necessary to notch higher than 100. This system is sometimes used as a check for ear tags in case the latter become torn out.

FIG. 9.—Punch used for inserting ear labels. Can also be used for notching.

Tattooing.—Tattooing on the inside of the ear is a satisfactory way of marking sheep, especially those having light-colored ears (see fig. 8, *c*). Special tattooing instruments are upon the market for this purpose having adjustable numbers and letters, with which a combination containing three or four of either or both can be secured. This is another good method of checking on the ear label. India ink, both stick and liquid, special tattooing oil, and indigo can be used for

pigment. The Department of Agriculture has had excellent results with all of these. Breeders sometimes tattoo their initials in the ears of all their sheep so as to eliminate any question of breeding.

Branding.—Branding is a common way of marking sheep in the West. It is done with branding paint upon the wool or with a hot iron upon the nose. Branding with paint upon the wool is the most common method. The paint brands are stamped upon a prominent place so that they can be readily seen; either on top of the shoulders, on the back, or on the rump. Quite often lots of sheep that are to be kept separate are branded some number in order that they can be readily identified if they become mixed. Different-colored branding paints are used, the more common being red and black. The brands are made of either wood or a small iron rod about three-eighths of an inch in diameter. Branding paints can be purchased upon the market ready for use, or they can be prepared upon the farm.

The disadvantage of branding lies in the difficulty of securing a paint that will remain legible throughout the season and yet scour off readily in the scouring processes of the wool. When the brands must be clipped off by hand the resulting loss of wool and labor is considerable. Branding with a hot iron is sometimes used in the range country because it makes a permanent mark, but this method is rarely, if ever, practiced upon the farm. Burning a brand upon the horns is used to some extent, but this method has been used more in foreign countries than in America.

CASTRATION.

It is surprising how many native lambs come to market without having been castrated. The operation is an extremely simple one, and the financial losses that result from failure to perform it are considerable. A ram lamb develops sexual characteristics at about three months of age. They then become restless, worry the rest of the flock, and fight among themselves and cause a generally unsatisfactory condition. They cease to make satisfactory gains themselves, and prevent the other members of the flock from doing so. The following experiment[1] was conducted to determine the difference in gain between ram and wether lambs. Two uniform lots, so far as breeding and age were concerned, of 12 each, were selected, one lot being castrated, the other left entire. Both received the same feed and treatment, yet at the end of the feeding period the rams weighed 900 pounds and the wethers 1,020 pounds.

In another instance[2] statistics secured from several years' observation upon a flock showed that wether lambs gained in 60 days on

[1] Abstract Experiment Station Record.

[2] Proceedings of the Society for the Promotion of Agricultural Science, pp. 163–165, 1901.

an average 2.25 per cent in live weight and 4 per cent in dressed weight more than did the buck lambs.

The bucks become coarse as they grow older. Their increase in weight is confined more to the fore quarters, neck, and head, which are the lower-priced parts of the carcass. Their frames are coarser and they do not have as deep a covering of flesh. Wether lambs, on the other hand, develop more in the loin and back, the region of the high-priced cuts. For these reasons ram lambs are sharply discriminated against as soon as sex character develops, and, generally, the older they are the sharper is this discrimination.

Upon the Buffalo market the difference in price between ram and wether lambs has ranged from $0.65 to $1 per hundred pounds in the same month in favor of the wether lambs. Quite often ram lambs grade as culls and sell for as much as $2 per hundred pounds less.

Ram lambs can not be profitably kept to wait for favorable market conditions, as they cease to make satisfactory gains after they have reached a certain age. Another reason for unsexing all ram lambs not desired for breeding purposes is that there is danger of getting the ewes in lamb to the poorest one in the flock. The ewe lambs are also often pregnant under these conditions when they arrive on the market, which is another objectionable feature.

Age of castration, methods, etc.—Castration should be done when the lambs are from 2 to 4 weeks old. If they are allowed to become older the operation is more severe. The quarters should be as clean as possible for the operation. One of the best methods is to cut off the lower third of the scrotum with a clean, sharp knife, and force the testicles down. They can be grasped by the thumb and two fingers and pulled out, one at a time, with the spermatic cords attached. If the lamb is rather old and the cords will not pull out, they can be cut or scraped off above the testicles. Many shepherds use their teeth for drawing out the testicles, but this is a disagreeable practice to many people. A pan of clean water containing a 2 to 3 per cent solution of some good disinfectant should be used by the operator in washing his hands and the knife, and the wound should be disinfected after the operation. Ointments, such as carbolized oil (20 parts sweet oil, 1 part carbolic acid) and pine-tar salve (equal parts pine tar and pure hog lard), are also recommended for dressing the wounds, but it is impracticable to use disinfectants or ointments when the flock is large.

Lambs are sometimes unsexed by cutting off the scrotum close to the belly with heated shears or with a special emasculator, but this method is not very satisfactory. It is seldom advisable to castrate an aged ram; the difference in value of the carcass is scarcely worth the trouble.

DOCKING.

There are a number of good reasons for docking a lamb, any one of which would warrant the operation. Practically the only use of the tail to the sheep is to protect the rearmost parts from flies. Docking is a cleanly practice; undocked sheep become very filthy and are likely to become infested with maggots. They bring a lower price upon the market because of the dirt and manure they carry and because of their uneven appearance. Docked lambs appear more blockly, and ewes that are docked are served by the ram more readily than undocked ones. The operation should be performed when the lambs are from 1 to 2 weeks old. Only winter or "hothouse" lambs, or those sold early, should not be docked.

Methods.—Hot pincers, pruning shears (see fig. 6), a sharp knife, and a chisel and block are all used in docking. Pincers (see Pl. III, fig. 2) are made especially for this purpose and are heated to redness before being used. On the ranges, where there are several men to catch and hold the lambs, from 15 to 35 tails can be docked with one heating. Reasonable care should be exercised in using these instruments. The principal advantages in their use are that the work is quickly and neatly done and that there is no loss of blood. Once this system is adopted no other is likely to be practiced.

Pruning shears are quite frequently used in docking and are satisfactory, especially when the lambs are docked young, before the wool has attained much growth upon the tail. The knife is the most common docking instrument upon the farm. The main objection to its use is that it may cause excessive bleeding. The chisel and block are used to a limited extent.

GRAIN BEFORE WEANING.

Usually lambs will begin to nibble grain along with their mothers when from 10 days to 2 weeks old. The amount of grain and the kinds that should be fed before weaning will depend upon the purpose for which they are intended. Hothouse lambs should be forced as rapidly as possible, hence should be given all the grain they will consume. Such feeds as corn meal, cracked corn, oats, bran, middlings, and oil meal are most commonly fed to this class of lambs. Corn should comprise a large part of the ration.

Spring lambs for slaughtering purposes should usually be fed heavier than those intended for the breeding flock. The Wisconsin station found that lambs fed grain from birth attained a given weight from four to seven weeks earlier than those receiving no grain before weaning, and required no more grain for the same amount of increase. Higher prices are usually obtained for lambs early in the season, and where the lambs have been fed grain from birth they are usually in higher condition and can be sold at any time when market conditions

are most favorable. The largest and most economical gains are made during the first few months of a lamb's life.

It is generally profitable to feed a small quantity of grain before weaning to all classes of lambs. They grow faster, attain a larger size, become more robust, escaping the ills that beset the slow-growing or stunted lamb. Where grain has been fed from the first the demands are not so heavy upon the ewe, and the lambs do not feel the effects of weaning as much as they otherwise would.

The average amount of grain per lamb per day should vary from one-fourth to one-half pound. The ration should be very light at first and should be gradually increased. Ordinarily, more than one-half pound per day will not increase the gains, but will lessen the amounts of pasture consumed by the lambs. Two parts bran, two parts oats, and one part cracked corn makes an excellent grain ration for growing lambs. Roots and alfalfa can also be fed to young lambs to advantage.

LAMB CREEPS.

The lambs should not eat with the ewes, but should have their grain separate. A lamb creep is necessary for this, and with it there is the advantage that the lambs can eat whenever they care to. A lamb creep is simply an inclosure, containing feed troughs, with openings large enough to permit only the lambs to enter. Rollers on the sides of the openings are much superior to slats, as they allow the lambs to enter through smaller openings, and with less danger of scraping their sides. A good type of lamb creep is shown in Plate IV, figure 1.

WEANING.

Weaning should take place when the lambs are 3 to 5 months old, depending upon the time they are dropped. After separating the lambs, they should be turned into a field at a considerable distance from the ewes, where there is good pasture. Where the lambs have been encouraged to eat previously, separating is merely the last step of weaning, and the lambs scarcely notice the change.

CARE AFTER WEANING.

After weaning, the lambs should continue having such feed and care as will continue their growth. A stunted lamb never makes up its lost growth, no matter how favorable circumstances may be afterwards. It generally pays to feed a little grain all through the summer. If they are to be fattened later the grain-fed lamb makes more rapid and economic gains than the one that has received no grain until the fattening period. There is little danger of getting lambs that are intended for breeding purposes too fat, unless an excess of fattening feeds are fed. The extra food they consume is used for

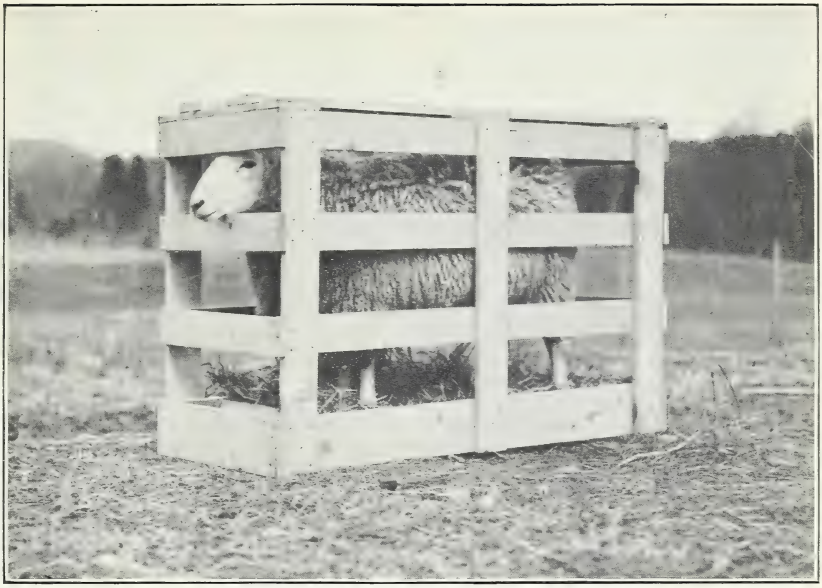

FIG. 1.—SHEEP CRATED FOR TRANSPORTATION.

FIG. 2.—METHOD OF DOCKING LAMB WITH HOT PINCERS.

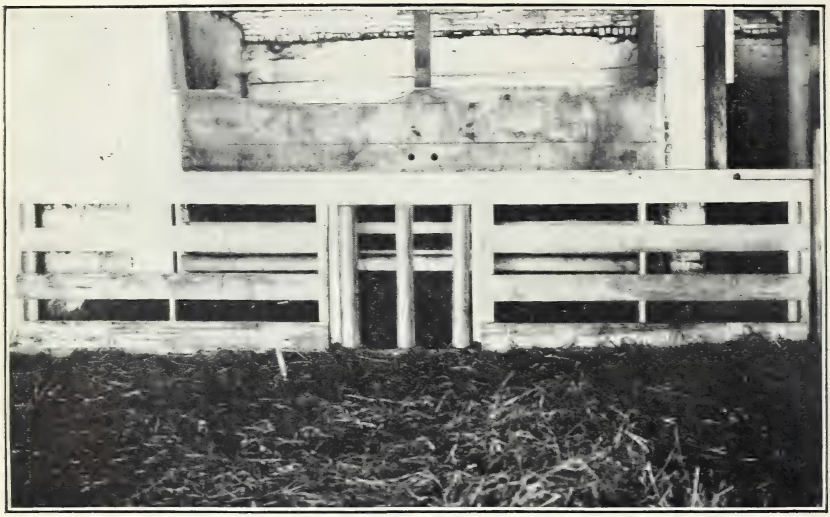

FIG. 1.—GOOD TYPE OF A LAMB CREEP, SHOWING THE USE OF ROLLERS.

FIG. 2.—TYPE OF TROUGH AS SHOWN IN FIGURE 15 IN USE.

more rapid growth, rather than storing up fat. Forage crops, such as rape and kale, make excellent fall pasturage for lambs, and where the lambs have such pasture they may need no grain.

SEPARATING THE RAM LAMBS.

The ram lambs should be separated from the ewe lambs when not older than 6 months. Where there are a number of these, they had better be separated when weaned.

CARE OF RAMS.

It is desirable that breeding rams be in strong condition before and during the breeding season. Because of the extra demands made upon them at this time they should be given extra grain in addition to their regular ration, beginning about a month before mating and continuing throughout the season. A mixture of equal parts of bran and oats is as good a grain ration as one can desire. This feed keeps the ram vigorous and does not induce fattening.

CARE DURING MATING SEASON.

Many farmers allow the ram to run with the ewes throughout the year, but this is a poor practice. It is much better to turn the rams in only during the breeding season, and this is the ordinary method. With many purebred flocks the rams are turned in only during the night.

It is good practice to paint the brisket of the ram every two weeks with a different colored paint, that will rub off on the ewes that are served. In this way the approximate time of mating can be determined, and also whether or not the ram is a sure breeder. A close watch should be kept upon an untried ram to determine his breeding qualities, as an infertile one, if not detected, will cause the loss of a lamb crop. One ram will cover the average farm flock, but it is advisable to have a second one, if the flock will warrant it, to use in case the stock ram proves a nonbreeder. From 30 to 40 ewes are covered by a ram where allowed to run with the flock.

Hand coupling.—Hand coupling is a very satisfactory way of handling the ram where the flock is not too large. It is often practiced in purebred flocks. With hand coupling the most practical way is to drive the ewes into a small lot in the morning and turn the ram in with them. He soon singles out a ewe that is in heat and as soon as he has served her she is removed. Two or three ewes can thus be served in the morning and as many more in the evening, after they have again been driven up.

Some shepherds turn in a teaser with the flock to single out the ewes that are in heat. An old ram with a gunny sack tied over his

belly to prevent his serving the ewes is commonly used for this purpose.

Hand coupling is superior to allowing the ram to run with the ewes, for the following reasons: One ram can cover more ewes because he is prevented from devoting all his attentions to one, and his energies are conserved by permitting only one service. The exact date of service can be kept, and an infertile ram can be detected much easier. As many as 100 ewes have been covered by a single ram with this method. The one objection to the practice is that it takes considerable time.

The length of the breeding season depends upon the time of the year. For instance, if rams are turned in with ewes during the months of August or September, the season would be much longer, owing to the fact that not so many of the ewes are likely to be in heat at this time. The season should be long enough so that the ewes can return in heat, if they do not become pregnant at the first service. The duration between periods of heat in a ewe ordinarily ranges from 14 to 18 days. In exceptional cases 21 days have elapsed between periods.

CARE AT OTHER TIMES.

During the winter the ram should receive enough grain to keep him in good condition. Clover or alfalfa hay makes good roughage, and silage or roots, such as turnips, swedes, and rutabagas should form the succulent part of the feed. Sugar beets or mangel-wurzels should never be fed to rams. They cause the formation of calculi in the kidneys and bladder, and stoppage of the urethra, and the bladder is often ruptured as a result. Many good rams have died as a result of their being fed these roots.

Where there is but one stock ram, he can be used only two seasons without inbreeding, but where there are several they can often be kept longer. In either case the rams should be well taken care of, and they can often be disposed of to good advantage to some other breeder. In this way, inbreeding will be avoided and the flock can be managed with little increased expense for rams.

CARE OF STORE SHEEP.

Ewe lambs that are intended for breeding purposes the following season should be separated from those lambs intended for the butcher before fattening begins. It is essential that the breeders should be kept in good growing condition, but it is unnecessary, and even undesirable, to have them fitted as highly as the market lamb. Neither should they be allowed to run with the breeding ewes during the winter, as their feeding requirements are somewhat different. If good roughage, such as alfalfa, or clover and roots, or silage, is

available, little grain need be fed during the winter, though a small amount may be desirable. If waste roughage is fed, more grain will be necessary. During the following spring and summer good pasture should be sufficient in itself, at least until flushing is practiced.

Holding over wethers is not a very common practice in the farming sections, nor is it a very profitable one, but there are some sections where it is done. Much waste roughage can be consumed by them, but they should not be allowed to subsist entirely upon these. It never pays to allow a sheep to become poor in condition, especially when growing. They can be maintained in good condition upon less feed than will be used in fattening them after they have been allowed to become thin. Good pasture should be sufficient for wethers during the summer season, and they may be partially fattened on grass. Wethers should never be fed mangel-wurzels or sugar beets for the same reasons previously mentioned for rams.

Ram lambs not used for breeding purposes should not receive as much grain as stock rams, but they should be kept gaining all the time. If these rams are to be sold, they should be kept in good condition, as well as attractive in appearance, as this adds materially to their ease of disposal and to the price obtained for them.

FEEDING SHEEP.

REGULARITY AND UNIFORMITY.

After sheep are fed a few times at a certain time of the day, they become accustomed to being fed at that time and will make their best gains only when regularity in feeding is practiced. Half an hour before feeding time the flock will be quiet, probably lying down. Within a few minutes of the time they are to receive their feed, they will come up to the gate or feed troughs and wait for the feeder. They soon become impatient if he does not appear, and much of the benefit of the feed is lost. Quiet and contentment are conducive to the largest gains and the best health of the flock.

Much of the same is true about the amounts of feed. Uniformity in this respect should also be practiced. A rapid change in the amount and kind of feed frequently results disastrously to sheep.

CLEANLINESS AND VARIETY.

Sheep are very particular about the feed they eat. They will not touch feed that has been "nosed over" by other stock, nor do they relish feed from filthy troughs. The troughs should be cleaned out before each feeding and they should be kept dry. Sheep in their primitive state were of a roving disposition, nibbling a little here and a little there. In this way they secured a variety of feeds. Under domestic conditions they should still receive as much of a variety as possible.

RETURNS FOR FEED.

In economy of production sheep are not surpassed by any other domestic animal. Besides converting waste products into nutritious food, they will also manufacture a finished product out of the roughage and grain of the farm at least as cheaply as other classes of live stock.

EXERCISE AS AGAINST CONFINEMENT.

Exercise is necessary for the natural development of the sheep. The different parts of the body must be used if they are to attain their highest efficiency. Hence, it is evident that the breeding sheep should have abundant exercise, even though it requires more feed. With market stock, however, the proposition is an entirely different one. In fattening lambs or sheep for the butcher, immediate results are sought and the farmer is not concerned with anything beyond securing the best animal for market purposes. Exercise sharpens the appetite and it also dissipates energy. Sheep that are exercised while being fattened eat their feed cleaner, and as a rule eat more of it, but in most of the experiments along this line they required a larger amount of feed per hundred pounds of gain than those receiving no exercise.

SHELTER COMPARED WITH OPEN FIELD FEEDING.

Since shelter is necessary for the best health of the flock, it is natural to suppose that larger gains will be made from a definite amount of feed when fed to sheltered sheep than from a similar amount fed to unsheltered ones. The protection offered by the shelter makes the sheep more comfortable and makes unnecessary the wasting of a considerable portion of the ration for keeping up the vitality of the sheep. Clean, airy sheds are undoubtedly superior to open lots for feeding.

GAINS AS AFFECTED BY SHEARING.

The effect of shearing upon the gains of fattening sheep is a subject that has occasioned considerable comment. The actual value of the practice depends upon the time of shearing, the condition of the sheep when shorn, the length of the fattening period, and the climatic conditions. When sheep are shorn in the fall, before cold weather, slightly larger gains can be secured than when unshorn, but except under the most favorable conditions it is doubtful whether the gains are large enough to be of very great importance to the farmer.

FEEDING FOR WOOL.

The best advice to be given in feeding for wool is to give such feeds as will completely nourish the sheep and to give them in such amounts and in such a way that the sheep will be kept in uniformly good condition throughout the year. The wool is an index to the physical

condition of the sheep. Disease or a change in condition are reflected in a weak place in the fiber, known as a "break." The same causes may effect a lack of luster in the wool, with the accompanying dead appearance that is undesirable.

An abrupt change of feed may cause sheep to lose their wool. For instance, sheep that have been raised upon grass, if fed a heavy grain ration without having gradually become accustomed to it, may shed their fleeces.

FEEDS.

It is practically impossible to give a definite feeding value to any particular feed. The value varies widely under different conditions. A certain feed will give quite different results when fed in connection with other feeds than when fed by itself. It may serve excellently as a partial ration, while it is altogether unsatisfactory for a total one. It may be rich in carbohydrates and fats, for instance, but lacking in protein, which is equally essential.

The digestibility of a feed is also influenced by the other ingredients of the ration, and this might affect its feeding value. Again, a feed may be too dense or too bulky, too dry or contain too much water to be suitable alone.

Neither is it practical to advise the particular kinds of feed, unless acquainted with local conditions. In the Middle West corn can often be fed profitably to a greater extent than elsewhere, because the transportation charges are unimportant. The same might be true of the cottonseed products of the South. Thus it is evident that the economy of a feed varies with the locality. However, there are certain groups of feeds some of which are essential for the best results with sheep. It is worth while mentioning these groups, leaving it to each farmer to select those particular ones best suited to his own conditions.

ROUGHAGE.

For roughage alfalfa, alsike, red-clover, cowpea, and similar hays are undoubtedly superior. Feeding tests in various parts of the country indicate that there is little difference in value between these forages, all of them giving excellent results. Corn stover, nonleguminous hays, and the various straws have been fed, in many cases with good results. Quite often these may profitably form a portion of the ration, but as a sole roughage they are inferior to the legumes. Timothy hay and millet are undesirable roughage for sheep; the former causes constipation and the latter often produces scouring.

METHODS OF FEEDING.

It is hardly necessary to say that there is less waste when roughage is fed in racks rather than upon the ground. When fed in the latter way much of it is trampled upon and soiled and the sheep then refuse to eat it.

There are several types of feed racks that are quite satisfactory. A combination rack for feeding both roughage and grain is convenient, especially where the amount of space is limited. Some racks are boarded up solidly, with openings through which the sheep eat; others are slatted horizontally, this type being largely used in the West. Racks with vertical slats are also used; these slats should not be too wide apart with suckling ewes or the lambs will get in upon the feed and soil it. Having the upper part of the rack boarded solid is desirable, as it prevents chaff from falling into the fleece. The arrangement and dimensions of various types of racks are shown in figures 10 to 13, inclusive.

PASTURE.

The sheep pasture should be well drained or foot rot will prove troublesome and the flock will not keep in the best of health. If

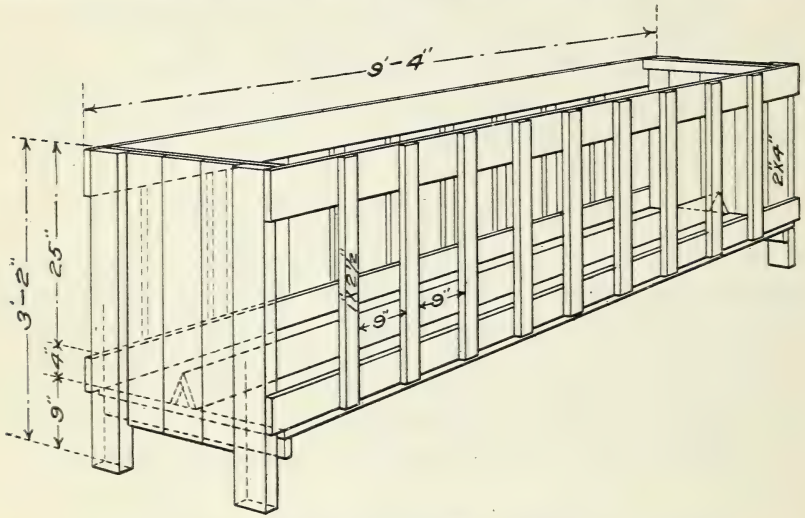

FIG. 10.—Combination rack for feeding hay and grain. Sheep can feed from either side.

the texture and structure of the soil of level fields is such that the rainfall is readily drained away, they may prove good feeding grounds, but as a rule rolling or hilly land is much better. Plenty of pure water is necessary and abundant shade is desirable, especially during hot weather, but sheep should not be allowed to lie under trees where manure has accumulated.

Avoid overstocking the pasture. If the sheep are too numerous they will eat the very roots of the grass, killing it and reducing the carrying capacity of the fields. Understocking is likewise undesirable, as it results in coarse, rank herbage that is not readily eaten by the sheep. Burrs and weeds that are not eaten should be destroyed, so that the seeds will not get into the fleeces.

Dead furrows are dangerous in a sheep pasture and should never be left open. Ewes rolling over into them upon their backs can not

rise to their feet unassisted, and most perish, if not discovered. The broadest-backed ewes are the most apt to suffer. Many a good one

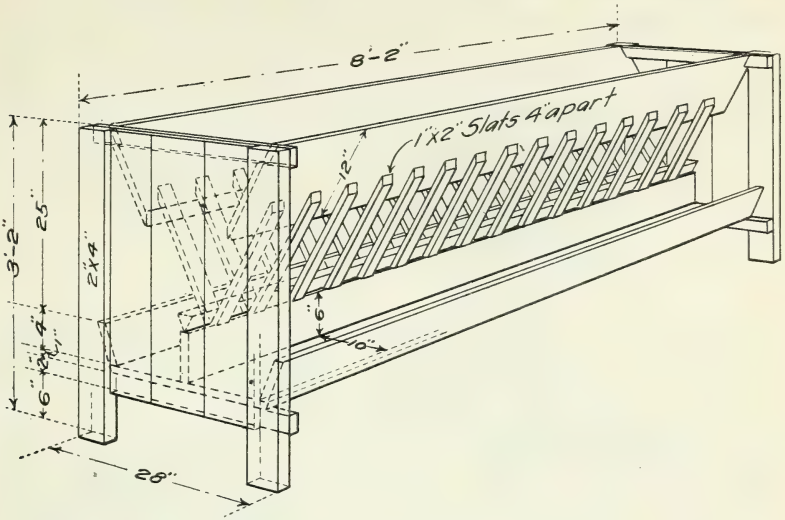

FIG. 11.—Combination rack for feeding hay and grain. Sheep can feed from either side. Note construction for keeping chaff, etc., out of fleeces.

has been found dead on her back because of the neglected "dead" furrow.

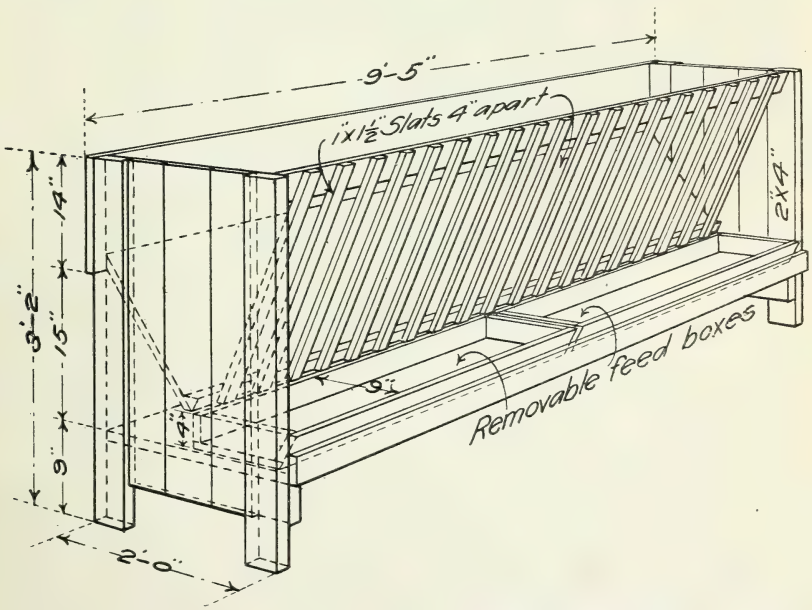

FIG. 12.—Combination rack for feeding hay and grain. Rack is so constructed that the grain troughs may be pulled back and feed put in them without entering the pen.

For permanent pastures blue grass, white clover, timothy, orchard grass, Bermuda grass, meadow fescue, and redtop are used. Blue

grass has been the basis of most of the permanent pastures, and it is undoubtedly the best pasture grass. Very often a mixture of several grasses proves quite satisfactory. The different clovers have been used for sheep pastures with success, but care should be exercised in their use, especially if they have been frosted. Alfalfa is also used and it is gradually gaining in popularity, but there are several precautions to be observed in its use. Bloating must be guarded against, and sometimes this is almost impossible. Sheep that have been successfully feeding upon alfalfa fields for weeks will suddenly be affected. No plausible reason can be given for this.

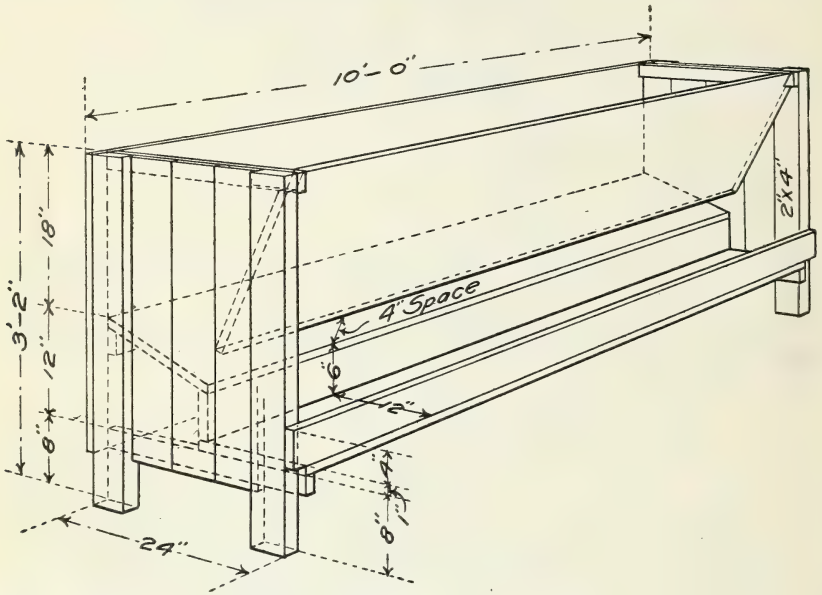

FIG. 13.—Combination rack for feeding hay and grain. Note construction for keeping chaff, etc., out of fleece.

The loss from bloat can be cut down to a minimum by careful management. It is generally agreed that having the sheep well filled up with their regular ration and watered before turning in will lessen the danger. Another precaution is to allow the sheep freedom upon the field. It is considered injurious to drive or hurry them.

Annual pastures are used in America more to supplement permanent pastures and to flush and fatten sheep than as a complete pasturage system. However, Shaw of Minnesota[1] maintained sheep throughout the season on annual pastures with fairly good results. A number of crops are used for annual pasturage, the most widely known of which are rape, oats and peas, rye, cowpeas, soy beans, barley, kale, and wheat.

[1] Agricultural Experiment Station of the University of Minnesota, Bulletin 78, St. Paul, 1903.

Rape.—Rape is one of the most popular of the annual pastures. It is largely used for pasture for lambs at weaning time and for flushing the ewes. There is more or less danger from bloat, however, and it is recommended that the sheep be given a full feed of their regular ration before being turned into the field. One reason for its wide popularity is that it can be sown after some early maturing crop has already been harvested, since it takes it but from 8 to 10 weeks to be ready for use.

Field peas.—Field peas are commonly used for fattening sheep in some parts of the West. The San Luis Valley in Colorado is especially noted for its pea-fattened lambs. The gains with field peas are very economical.

Oats and peas.—Oats and peas sown together make excellent forage, and several crops of these can be raised if the time of planting between successive crops is about two weeks.

Rye.—Rye is commonly used for fall and winter pasture, and it is also used in the spring until the joints appear. Its use is probably more widespread than that of any of the other annual pastures.

Vetches.—Vetches are usually sown with some other crop, such as oats, rye, peas, or rape, and have proved a valuable pasture in some sections, especially in the South.

Cowpeas and soy beans.—These have been used less for pasture than for hay.

Barley.—Barley is used to a limited extent for sheep pasture in the South.

Kale.—Kale makes an excellent pasture of somewhat the same nature as rape. It is not commonly used in this country except in the Willamette Valley, where the famous long-wooled sheep of this region feed upon it.

Wheat.—Many farmers allow their sheep to pasture upon their wheat fields for a short time in the spring, especially if the wheat is making too rapid growth.

FEEDING ROOTS.

Roots are to sheep in winter what pasture is in summer. In late years silage has been substituted for them to a certain extent, but, nevertheless, they still maintain a wide popularity. Breeding ewes, especially, thrive upon this form of succulence, roots going a long way toward producing a strong, healthy lamb crop. All classes of sheep are prevented from becoming constipated and kept in healthy condition by their use. The dry matter of roots has no special advantage over that of grain, but on account of their wholesome effect in toning up the system they are invaluable in feeding sheep.

Roots should be pulped or cut into small pieces for feeding. A root cutter is almost indispensable where many roots are fed. Up to 10 pounds per sheep per day have been fed, depending upon the

class of sheep, but this is a rather heavy ration. The amount of roots may also vary with the available supply and the amounts and kinds of other feeds in the ration. During pregnancy the ewes of the Government flock of Southdowns at Middlebury, Vt., receive 2 pounds of turnips per day, and excellent results have been obtained.

Turnips, swedes, and rutabagas are the best roots for all classes of sheep. Sugar beets and mangel-wurzels should not be fed to rams or wethers under any conditions, because of their bad effect on the kidneys and bladder, and should not be fed to ewes that are far advanced in pregnancy, as it is believed that their use may cause abortion.

SILAGE.

Silage of good quality has been fed to all classes of sheep with success. The use of this succulence for sheep has attracted the attention of most farmers only during the past few years, but some breeders fed it years ago with good results. A great deal has been said of its bad effects upon sheep, but these have arisen because a poor quality of silage (acid, frozen, or moldy) has been fed. This succulence is supplanting roots to a considerable extent because of its cheaper cost of production. Three to 4 pounds per day is as much as should usually be fed, though there are trials reported where as much as 5 pounds have been successfully given.

The Purdue Experiment Station[1] reports, after three years of experimenting, that silage is an extremely palatable food and a desirable form of succulence for breeding ewes and lambs. The pregnant ewes receiving silage made larger gains than those receiving a similar ration without it. Ewes with fall lambs also made larger gains when fed silage. The gain with fall lambs was in favor of the silage-fed lot. From 2 to $4\frac{1}{2}$ pounds were fed to pregnant ewes.

Clover silage has proved a very satisfactory feed, but the cost of making and the difficulty of keeping were against it. Pea silage has also been fed to a limited extent. Ensiled beet leaves have been fed in Germany, but they are not very nutritious. Emphasis must be placed upon the importance of using silage of good quality, as the use of a frozen, acid, or moldy product has often resulted fatally.

CABBAGE.

Cabbage is largely used for feeding show sheep. Sheep like it very much, eating it when they refuse all other feed, and it has a good effect upon them. From 2 to 3 pounds per day give good results. The cost of production is too high for it to be used for commercial feeding. Another objection to its use is that its keeping qualities are poor.

---

[1] Agricultural Experiment Station of Indiana, Bulletin 147, La Fayette, 1910.

PUMPKINS.

Pumpkins are a very satisfactory stock food and are readily eaten by sheep. Their keeping qualities, however, are such that they can be fed only through the fall and early winter. They should be cut into small pieces and fed in about the same quantities as roots. A crop of pumpkins can often be grown in the cornfield, and their feeding value and the variety they add to the ration amply repay the extra cost.

SOILING CROPS.

Little work has been done on soiling market sheep. Daintiness on the part of the sheep in refusing to eat feed that is in any way unclean, the variety desired by the sheep, and the extra amount of labor necessary preclude this practice. Henry, at the Wisconsin Experiment Station[1] soiled a lot of sheep on green-corn fodder and clover, and produced gains at a reasonable cost, but it is hardly possible that soiling will ever be important in commercial flock husbandry because of the difficulties mentioned. Show sheep are more often soiled, as more time and attention can be devoted to them.

CONCENTRATES.

Although sheep are eminently adapted to digesting large amounts of roughage, they also can use grain to good advantage and under many conditions give the best results only when they receive it.

Corn.—Corn has been fed more to fattening sheep in this country than any other grain. The ears are sometimes chopped and fed in this way. More often it is fed shelled, cracked, or ground into meal. Corn-and-cob meal is also used. The value of the cob lies in the fact that it lightens the ration. It should be ground fine or the cob will not be eaten. While corn is an excellent grain for fattening stock, it is suitable only in small amounts for breeding and young stock. It is too carbonaceous in character to form more than a small part of their ration.

Barley.—Barley is widely used in fattening sheep outside of the corn belt. In the West and Northwest it has gained its widest popularity, and the results from its use have been quite favorable as compared with corn.

Oats.—Oats are an excellent grain for growing sheep or for breeding stock, especially when fed in connection with other grains. When fed alone for fattening purposes oats are not generally as satisfactory as corn or barley. However, some western trials report very satisfactory results.

Wheat.—Because of the continued high price of wheat it is of little importance as a feed for sheep. Damaged wheat and screenings are fed to sheep, but not to as great an extent as formerly.

---

[1] Agricultural Experiment Station of the University of Wisconsin, Eighth Annual Report (1891), Madison, 1892.

Spelt.—Spelt, or emmer, is a rather inferior grain for sheep. In most of the feeding trials in this country where spelt was fed it was at or very near the bottom of the list.

Peas.—Cracked peas and pea meal are highly nitrogenous feeds; they have given their best results when fed with other grains.

Cotton seed, cottonseed meal, cake, and hulls.—Whole cotton seed is fed to sheep to a certain extent in the South. About one-fourth of a pound per head is usually given. Ground cotton seed has also been fed. Cottonseed meal is the most important of these feeds. It is rarely fed alone. In the South the meal is mixed with the hulls and is considered a very satisfactory feed. One pound of meal to 4 or 5 pounds of hulls is the ordinary proportion. The cake is also largely fed, and it is a very convenient form. The use of these feeds outside of the South is to supplement rations low in protein; consequently, they are usually fed in small amounts. In fact, it is inadvisable to feed large amounts, as these feeds are very dense and concentrated.

Flax, linseed cake and meal.—Flax is sometimes sown with oats, the flaxseed and oats being fed together after being thrashed. Ground flaxseed has also been fed to sheep with good results, but it is too expensive to become widely used. Pea or nut sized linseed cake is more desirable than the meal for sheep, as it is more easily masticated. These feeds are high in protein and are largely used for the same purpose as the cottonseed products, but they do not have the undesirable features of these latter products.

Gluten meal and gluten feed.—Both gluten meal and feed have been fed with good results. The meal is a very concentrated feed of much the same nature as linseed meal. Gluten feed can be used to good advantage in combination with oats, bran, etc., and when thus fed makes an excellent ration for ewes suckling lambs.

Bran.—Bran is a superior concentrate for sheep when fed in connection with the various grains and usually constitutes from one-fourth to one-half of the mixture. It is especially good for breeding ewes or growing stock, being more muscle than fat building in character, and it also has a good effect upon the digestive system, acting as a laxative and toning up the sheep. It also forms an excellent medium for holding together the other concentrates of the ration.

Beans.—Beans are reported by the Rothamsted station in England as being undesirable for sheep, but good results have been obtained from their use in this country. They are either cracked or fed as bean meal. Generally beans are too high in price to be fed, but damaged or discolored ones, when available, can often be profitably fed. A small quantity of ground beans has been successfully used in the ration of show sheep.

GRAIN TROUGHS.

A number of different kinds of grain troughs have been advocated for feeding the grain ration. The V-shaped trough is a very common type but is not very desirable, as too much grain is thrown out and wasted by its use. The flat-bottomed trough is much superior in

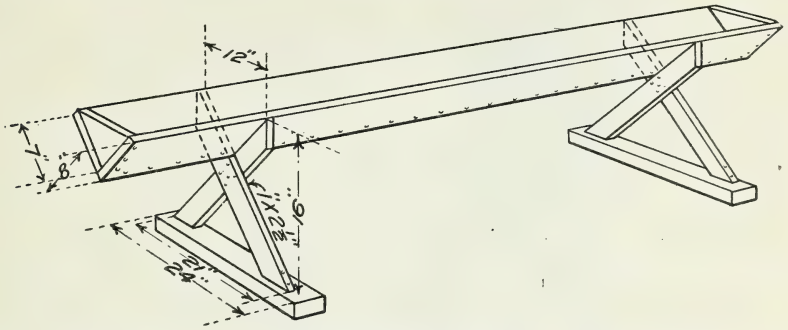

FIG. 14.—V-shaped grain trough. This type is extensively used, but is objectionable on account of the large amount of feed that is thrown out and wasted.

this respect, and it is also the best type for feeding roots. Two troughs (bottoms together) are sometimes mounted upon pivots, forming a reversible trough. They are cleaned out by revolving, the one being inverted while the other is in use. They are especially

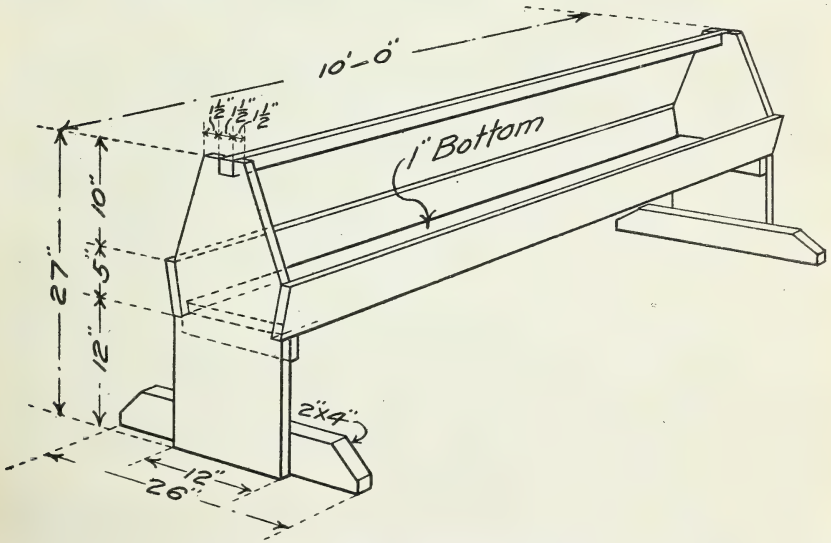

FIG. 15.—Excellent type of trough for feeding grain and roots.

desirable for feeding grain outdoors. The combination trough and rack has already been described on page 38. The V-shaped and flat-bottomed troughs are illustrated in figures 14 and 15 and Plate IV, figure 2.

MISCELLANEOUS FEEDS.

Potatoes.—Potatoes are ordinarily too valuable to be fed profitably to sheep. Heavy yields have occasionally in past years lowered the market price to such an extent that it did not pay to market them. On such occasions potatoes are an economical feed for sheep. They should be cut up in small pieces like roots. Small potatoes can also frequently be fed to sheep with profit.

Molasses.—Molasses has been fed to sheep with more or less success. It can be fed either with the grain or roughage.

Sugar.—Low-grade sugar is sometimes fed to sheep. It is sometimes sprinkled upon the lambs' ration to induce them to eat.

Wet and dry beet pulp.—Wet beet pulp can profitably be fed to fattening sheep, if the source of supply is near at hand. It can form a considerable portion of the ration during the first part of the fattening period, as much as 12 to 15 pounds having been fed, but during the latter part it should be fed only in small amounts to act principally as an appetizer. If largely fed at this time it is said to produce soft flesh.

Dried beet pulp has, in some cases, produced larger gains than the wet. It can be used for feeding over a much larger area, because of its reduced weight and better keeping qualities.

Meat meal.—This product of the slaughterhouse has been fed to sheep to a limited extent. Dried blood has also been fed to young lambs with reported success.

Water.—The flock should constantly have access to an abundant supply of clear, pure water, both while in the barn and in the pasture. It has been stated that the dew on the grass furnishes enough water, but such is not the case. It is true that sheep can exist upon dews and snows for a long time, but to expect them to thrive under these conditions is certain to prove disappointing. A sheep needs from 1 to 6 quarts of water per day, depending upon the nature of the ration, climate, size of sheep, etc. They should never be forced to drink dirty or stagnant water because of the danger of contracting disease.

Salt.—Either too much or too little salt can be fed to sheep. It is sometimes claimed that an overdose of salt will cause abortion in pregnant ewes. The veracity of this statement has never been proved, but it is a wise precaution to avoid an excess, especially if the flock has had none for a long time.

By having a constant supply available the sheep can help themselves whenever they desire, and there is no danger of their consuming too much. Rock salt is a convenient form for this purpose, especially when fed outside. If granular salt is used in the winter time, a little sulphur and pulverized copperas mixed with it acts as a tonic and improves the health of the flock. These can be mixed by the flockmaster himself and take the place of the "so-called" medicated salts.

SHEARING AND CARE OF THE WOOL.

Flocks are shorn in some parts of the United States during almost every month of the year. From Texas to Montana there is a range of six months in the time of shearing. In Texas and California the flocks are shorn twice a year, spring and fall. By this practice it is claimed a pound more of wool per sheep is obtained. However, the staple is not so valuable because of its shorter length.

Most farm flocks are shorn during April and May. The time of shearing will vary with the locality, season, shelter available, etc. Shearing should not take place too early or the sheep will suffer from the cold, and it should not be delayed too long or they will be affected by the heat. In the latter case they lose flesh and shed their wool.

The Michigan station[1] found that early shearing (during April) gave heavier average fleeces with greater strength of fiber. Where early shearing is practiced, suitable shelter should be provided until the sheep become accustomed to the change. As mentioned under "Shearing breeding ewes," the flock should be shorn before being turned out to pasture.

In former years it was common to wash sheep before shearing, but this is seldom practiced at the present time. Sheep should never be shorn when the fleece is damp. There is danger of deterioration in quality when damp wool is stored.

MACHINE COMPARED WITH HAND SHEARING.

Machine shearing is gradually taking the place of hand shearing, especially in the larger flocks. One can learn to shear much faster, the work is easier, more sheep can be shorn in a day, more wool secured, and a smoother and neater job can be done with a machine. The sheep are not cut so often nor so severely, and "second cuts" of the wool are not so frequent as with hand shears. However, shearing with a machine is objectionable either early or late in the season because the wool is shorn so closely.

A clean place should be provided for shearing. Every possible precaution should be taken to keep all foreign material out of the wool. If a smooth, clean floor is not available, a temporary platform should be built. In shearing by hand many shearers prefer to use a bench about 18 inches high. The principal objection to this is that it is necessary to lift the sheep upon it. The sheep should be confined near the place of shearing to lessen the amount of work in handling them.

With the ordinary farm flock a hand machine is commonly used, but power machines are advisable where the size of the flock will warrant it. A sufficient number of combs and cutters should be kept on hand to cover breakage and prevent delay in shearing.

---

[1] Experiment Station of the Michigan Agricultural College, Bulletin 178, East Lansing, 1900.

METHOD OF SHEARING.

While it is impractical to tell exactly how to shear a sheep, there being several methods of procedure, the following precautions are worthy of mention.

The sheep should be handled humanely and held so that they will struggle as little as possible. The skin should be kept stretched beneath the shears, so as to avoid unnecessary cutting. Special care should be taken in shearing the ewes about the udder and the ram about the sheath.

The shears should be kept close to the body of the sheep and not allowed to run off at a tangent, as this makes necessary a second cutting of the wool. The fleece should not be broken, but kept entire throughout the operation. After removing, it should be spread out in a clean place, cut side down, and as much as possible of the foreign material thrown out. The tags should be separated from the remainder of the fleece and placed by themselves. Loose parts of the fleece should be placed in the center, ragged edges turned in, then the fleece should be rolled up, cut side out, and tied with appropriate twine. It should not be rolled too tightly, and too much twine should not be used. Once around the fleece each way is sufficient. Wool boxes should not be used for tying. Their use makes attractive fleeces, but the wool is tied up too tightly and wool buyers discriminate against it in this condition. It is important that the right kind of twine be used. A light, smooth, hard twine should be used that will not become entangled in the fleece, and thus leave fibers in the wool. Sisal is very objectionable from this standpoint. The fiber from this twine gets into the wool and is woven into the cloth. It will not take the dye, and consequently it must be picked out by hand. The use of sisal has caused a loss of thousands of dollars, and many buyers refuse to purchase wool that has been tied with this twine. Others cut the price from 4 to 5 cents per pound for its use. Much wool twine, which is objectionable in no other way, is much coarser than is necessary. Linen or paper twines are excellent for tying, the objection to paper twine being that it is stiff and difficult to knot. A string from 7 to 8 feet long is sufficient for tying an ordinary fleece.

WOOL SACKS.

The use of better wool sacks is one way in which the condition of the domestic clip can be improved. Australia is much more progressive in this respect. The sacks used there are smooth, free from fiber, and occasionally lined with paper. On the other hand, American wool comes to the market in the cheapest possible sacks, and frequently they are not even shaken out before being filled. Many sacks come to market containing only about half as many fleeces as

they are capable of holding. By packing down the fleeces the expense for sacks can be cut down considerably, and they will handle all the better. From 30 to 40 fleeces can be placed in a sack, if well packed.

STORING WOOL.

It is a rather infrequent practice to store wool upon the farm, as it is usually sold soon after shearing. When stored, a clean, dry, vermin-proof place should be selected. A piano box is a very suitable receptacle for wool, if it is not immediately sacked. However, it is much better to sack the wool immediately after shearing, as it can be kept much cleaner.

COST OF MAINTENANCE.

The principal difficulties in computing the cost of maintenance of sheep are that they are usually kept in connection with other stock, and that oftentimes they consume feeds that would otherwise go to waste. There is also a wide range in the cost of maintenance in the different parts of the farming section, due mostly to climatic conditions. In the South, where little or no shelter is provided, and where the sheep subsist almost entirely upon pasture, the cost is very low; but where sheep must be housed and fed for several months of the year, as in New England, the other extreme is found.

The cost of maintaining sheep has been estimated at from $0.50 to more than $5 per head per year. The Tariff Board[1] reported an average cost of $2.44 for fine wool and $2.78 for cross-bred sheep in Ohio and neighboring States. The cost of maintenance in the farming section would probably average between these latter figures.

But even with the average cost given, it is impossible to calculate beforehand the profits of sheep husbandry. Those having had experience are aware of this fact. Differences in expenditures and receipts, due to management, location, fluctuation of market prices, and accidents, make the most careful calculations misleading.

While it is impossible to calculate beforehand the profits, and while it is difficult to obtain the exact cost of maintenance, it is nevertheless very important that records of receipts and expenditures, as complete as possible, be kept of the flock. These would not only indicate whether a man was making a profit or losing money, but would show the cost of keeping sheep to be made up of a number of items, several of which would probably be capable of considerable reduction. The items generally capable of reduction are labor, forage, depreciation on equipment and breeding stock, and mortality.

[1] Report of the Tariff Board, vol. 2, pt. 2.

METHODS OF REDUCING COST OF MAINTENANCE.

By having the sheep barn conveniently arranged, and by having all necessary equipment, such as hurdles, lots, and chutes, the labor cost can be reduced. It can also be lowered by having the largest flock the conditions will permit.

By growing on the farm most of the feed, especially the most expensive part of it, and by raising crops that will yield highest, the cost of feed can be lowered. Sheep farming rarely pays where a large part of the feed must be bought. Depreciation on the equipment and the flock can be controlled to a certain extent. Keeping the barns, sheds, and lots in good order lessens this item. Repairing done immediately is far less expensive than when it is delayed. The depreciation of the flock depends more or less upon the care it gets. The best management will reduce this considerably. The ordinary loss from mortality can also be reduced by the best care and management.

Interest upon the investment, taxes, and insurance are practically fixed charges. Making the investment as low as possible and securing the most favorable rates of interest and insurance are reductions that may be practiced.

It is not necessary to have expensive sheep buildings. As mentioned before, sheds can be made to serve the purpose excellently, and as good results can often be secured with them as with more pretentious structures. Quite often unoccupied portions of the barn or vacant sheds can be made ready for sheep at a small cost, thus further reducing expenses. It is well to start out with inexpensive buildings, then if the flock warrants it these can be replaced with better ones.

While it is desirable to reduce the cost of maintenance in the ways enumerated above, it does not pay to sacrifice anything essential to continued development of the flock. It is poor policy to reduce this cost at the expense of health or productivity.

CONSUMPTION OF MUTTON ON THE FARM.

MUTTON NOT FULLY APPRECIATED IN THE UNITED STATES.

Mutton never has been as highly appreciated in America as it should be. Probably one reason for this has been the supply of cheap beef that this country has enjoyed up to the past few years. The days of cheap beef are over, however, and it is necessary that some substitute for it be found. Mutton is the logical solution of the problem. It is true that the people will have to be educated more thoroughly as to its value, but mutton is now more in favor as a food than it used to be. A particular class of American people who have underrated mutton are the farmers, many of whom keep a

flock yet seldom, if ever, slaughter one for their own use. A lamb or sheep could frequently be killed for use by the flock owner and it would prove much cheaper than buying meat. There would also be the satisfaction of knowing that the meat was fresh and wholesome.

PRECAUTIONS IN SELECTING SHEEP FOR SLAUGHTERING.

Probably one reason why mutton has not been more popular on the farm is that not enough care has been exercised in selecting and slaughtering the sheep. To get the best mutton a sheep should be selected that is in good health; gaining rather than losing flesh. It should be in fairly high condition also, as this insures more tender and juicy meat. If the animal is too old the mutton will be tough and unsavory.

No feed should be given for 24 to 36 hours before killing, or the carcass will be reddish looking and unattractive and there will be more danger of the woolly taste. However, plenty of water should be given. The sheep should not be allowed to become excited or overheated, nor should it be driven a long distance immediately before slaughtering. If something of this kind has taken place, the sheep should be allowed to recover from it before being killed.

SLAUGHTERING SHEEP.

The following paragraphs upon slaughtering sheep are taken from Farmers' Bulletin 183, "Meat on the Farm: Butchering, Curing, and Keeping."

Much of the sheepy flavor of mutton comes from the generation of gases in the stomach after the sheep is killed. For this reason sheep should be dressed as rapidly as possible. A platform 6 or 8 inches high is a convenient thing to work on and aids in keeping the blood away from the body, insuring a cleaner carcass. A clean, dry place is necessary for neat work. Water or blood on the wool makes it very difficult to dress the animal nicely.

Killing.—If the sheep is an old one it may be stunned before bleeding. If a young one the same purpose is served by dislocating the neck after cutting the throat. This is accomplished by putting one hand on the poll or top of the head and the other hand under the chin, giving a sharp twist upward. Lay the sheep on its side on the platform, with its head hanging over the end. Grasp the chin in the left hand and stick a knife through the neck just back of the jaw. The cutting edge of the knife should be turned toward the spinal column and the flesh cut to the bone. In this way it is possible to avoid cutting the windpipe.

Skinning.—Split the skin over the back of the front legs from the dew claws to a little above the knees. Open the skin over the windpipe from brisket to chin, starting it slightly on the sides of the neck. Split the skin over the back of the hind legs to the middle line and skin the buttock. The skin should also be raised over the cod and flanks. Skin around the hocks and down to the hoofs, cutting off the hind feet at the toe joints. Run the knife between the cords and bone on the back of the shins, and tie the legs together just above the pastern joints. No attempt should be made to skin the legs above the hock until after the carcass is hung up. Hang the sheep up by the hind legs and split the skin over the middle line. Start at the brisket to "fist off" the skin. This is done by grasping the edge of the pelt firmly in one hand, pulling

it up tight and working the other with fist closed between the pelt and the body. The "fisting off" should be downward over the fore quarters and upward and backward over the hind quarters and legs. It is unwise to pull down on the skin over the hind legs, as the membrane covering the flesh is sure to be ruptured and an unsightly appearance given to the carcass. The wool should always be held away from the flesh for the sake of cleanliness. The skin on the legs should be pulled away from the body rather than toward it, in order to preserve the covering of the meat. When the pelt has been loosened over the sides and back it should be stripped down over the neck and cut off close to the ears. The head may then be removed without being skinned by cutting through the atlas joint.

Gutting.—Begin removing the entrails by cutting around the rectum and allowing them to drop down inside. Do not split the pelvis. Open down the belly line from the cod to the breastbone and take out the paunch and intestines, leaving the liver attached to the diaphragm. If the mutton is for home use, split the breastbone and remove the heart, lungs, and diaphragm together. For marketing it is best not to split the breast. Reach up into the pelvis and pull out the bladder. Wipe all blood and dirt from the carcass with a coarse cloth wrung nearly dry from hot water. Double up the front legs and slip the little cord, found by cutting into the fleshy part of the forearm, over the ankle joints.

CARE OF THE MEAT.

After dressing, the carcass should be cooled to 40°, or as near that as possible. In the summer it will be necessary to have ice for this purpose. Where there is a farm refrigerator the carcass can be placed in it, provided there is a circulation of dry air and no objectionable odors are present. Mutton can be kept for a week or ten days under these conditions. In the majority of cases, however, ice is not available on the farm. Under these conditions the sheep or lamb, as the case may be, should be slaughtered in the evening, the carcass allowed to hang out overnight (where nothing will disturb it), and taken to a cool dry room or cellar in the morning, before the flies are about. If the carcass is split it will cool out more rapidly. Under these conditions it is a good plan for two or more farmers to club together, each taking a part of the carcass, so that there will be no danger of the meat spoiling before it can be used.

In the winter there is little difficulty about keeping the meat. A good way to keep mutton at this time is to allow it to freeze up and to cut off enough for use from time to time with a saw. A single freezing does not injure the quality, but alternate freezing and thawing is harmful and should be avoided.

Lamb and mutton should never be used for food until it is thoroughly cooled out. Lamb is as good as it ever will be as soon as it is thoroughly cooled, but mutton improves with ripening for a week at 40° to 45° F. Mutton can be corned, but it is not as palatable nor is it as nutritious as the fresh meat. The hams are sometimes spiced and are considered by many to be a delicacy when prepared in this way.